AN EMPIRICAL INVESTIGATION OF SMARTPHONE TECHNOLOGY ACCEPTANCE AMONG UNIVERSITI UTARA MALAYSIA STUDENTS

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ABSTRACT

This study investigated smartphone technology acceptance among Universiti Utara Malaysian (UUM) students by using the Technology Acceptance Model (TAM). The rapid diffusion of computer technology into smartphone increases smartphone penetration among Universiti Utara Malaysia students. The aim of this study was to determine the relationship of Perceived Ease of Use (PEU) and Perceived Usefulness (PU) as independent variables, and Attitude (ATT) and Behavioural intention (BI) as dependent variables on Smartphone Technology Acceptance among Universiti Utara Malaysia students. In addition, in this research Gender was used as a moderator to test the relationship between Attitude (ATT) and Behavioural intention (BI). In order to collect data a total of 500 questionnaires were distributed to (UUM) final year and postgraduate students in three colleges COB, CAS and COLGIS. The hypothesis results showed that there was a significant relationship among the four variables except Gender. This was because Gender failed to moderate in explaining the relationship between Attitude (ATT) and Behavioural intention (BI). On the other hand the statistical result showed that there was partial mediation effect of Perceived Usefulness (PU) on the relationship between Perceived Ease (PEU) of Use and Attitude (ATT) on Smartphone Technology Acceptance among Universiti Utara Malaysian students. Furthermore the researcher found that there was a significant relationship between both the dependent variables - Attitude (ATT) and Behavioural intention (BI) on smartphone technology acceptance among UUM students. The overall finding showed that technology advancement and breakthrough design of smartphone technology are the key factors that attract Universiti Utara Malaysia students to accept smartphone technology. On the other hand, usefulness and ease of use of the smartphone technology play important roles in influencing (UUM) students to have the intention to use smartphone technology in accomplishing their personal tasks. This is because the usefulness of smartphone technology with promising results makes (UUM) students rely heavily on this device.

Keywords: Smartphone technology, Technology Acceptance Model, Malaysia.

ABSTRAK

Kajian ini menyiasat aspek penerimaan teknologi telefon pintar di kalangan pelajar Universiti Utara Malaysia (UUM) dengan menggunakan Teori Model Penerimaan Teknologi (TAM). Perkembangan fungsi teknologi telefon pintar yang setanding dengan teknologi komputer mewujudkan permintaan tinggi terhadap telefon pintar di kalangan pelajar UUM. Kajian ini bertujuan untuk menentukan hubungan antara Kesedaran Kemudahgunaan (PEU) dan Kesedaran Kebergunaan (PU) yang berfungsi sebagai pemboleh ubah bebas, serta Sikap (ATT) dan Niat Tingkah Laku (BI) sebagai pemboleh ubah bersandar terhadap penerimaan teknologi telefon pintar di kalangan pelajar Universiti Utara Malaysia. Di samping itu, jantina (Gender) digunakan sebagai moderator untuk menentukan hubungan antara Sikap (ATT) dan Niat Tingkah Laku (BI). Untuk mengumpul data, sejumlah 500 borang soalselidik telah diedarkan kepada mahasiswa sarjana muda tahun akhir dan pascasarjana merangkumi tiga buah kolej utama di UUM iaitu COB, CAS dan COLGIS. Hasil analisis hipotesis menunjukkan terdapat hubungan signifikan antara empat pembolehubah yang dinyatakan kecuali jantina. Ini disebabkan hasil analisis menunjukkan bahawa jantina (Gender) gagal menerangkan hubungan antara Sikap (ATT) dan Niat Tingkah Laku (BI). Selain itu, terdapat kesan pengantaraan separa aspek Kesedaran Kebergunaan (PU) antara Kesedaran Kemudahgunaan (PEU) dan Sikap (ATT) terhadap penerimaan teknologi telefon pintar di kalangan pelajar UUM. Secara keseluruhannya, hasil kajian menunjukkan bahawa kemajuan teknologi dan reka bentuk telefon pintar merupakan faktor utama yang mempengaruhi penerimaan teknologi telefon pintar di kalangan pelajar Universiti Utara Malaysia (UUM). Selain itu, Kesedaran Kebergunaan (PU) dan Kesedaran Kemudahgunaan (PEU) juga memainkan peranan penting bagi mereka untuk bergantung sepenuhnya pada peranti ini.

Kata kunci: Teknologi telefon pintar, Teori Model Penerimaan Teknologi, Malaysia.

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TABLE OF CONTENTS

CHAPTER TWO: LITERATURE REVIEW

CHAPTER THREE: RESEARCH METHODOLOGY

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATION

ATT	Attitude
BI	Behavioural Intention
CAS	College of Arts and Sciences
CA	Cronbach's Alpha
COB	College of Business
COLGIS	College of Law, Government and International Studies
DV	Dependant Variable
FA	Factor Analysis
ICT	Information and Communication Technology
IT	Information Technology
IV	Independent Variable
MBL	Mobile Based Learning
MCMC	Communication and Multimedia Commission
MIS	Management Information System
MBWA	Mobile Broadband Wireless Access
PBC	Perceived Behavioral Control
PC	Personal Computer
PCA	Principal Component Analysis
PDA	Personal Digital Assistant

PEOU	Perceived Ease of Use
PU	Perceived Usefulness
RA	Relative Advantage
RO	Research Objective
RQ	Research Question
SD	Standard Deviation
SE	Self Efficacy
SN	Subjective Norm
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TAM2	Extension Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology
UUM	Universiti Utara Malaysia
UMTS	Universal Mobile Telecommunications System
W-Lan	Wireless Local Area Network

CHAPTER ONE
INTRODUCTION

1.0 Background of Study

Since Apple launched its first iPhone in 2007, it raised smartphone ownership among general consumer professionals and students. This also accounted for the increase in demand for smartphones (Jongepier, 2011). Mobile revolution was converting both developed and developing countries from using ordinary mobile phone to smartphone (Wong, 2012). Mak, Nickerson & Isaac (2009) postulated that user's education level is one of the factors that influenced the acceptance and attitude towards mobile phone usage. According to Balakrishnan & Yeow (2007) young people show higher satisfaction level regarding smartphone functions than older people. Kuss & Griffiths, (2011) stated that the dramatic spread of smartphone make young people turn out to be addictive towards social networking sites (SNS) that creates negative psychological outcomes such as relationship problems, poorer academic performance and decreased real-life community involvement. One of such groups of people who highly depend on smartphone technology is student and this dependency has increased the continuous use and patronage of smartphones which also influences future purchase (Ting, Lim, Patanmacia, Low & Ker, 2011). Jacob & Isaac (2008) stated that the increasing number of smartphone sales in recent years was due to the highest contributors from university students. Thus the Technology Acceptance Model (TAM) used in this study to identify factors influencing the acceptance of smartphones technology among Universiti Utara Malaysia students.

Ant´on, Camarero & Rodr´ıguez, (2013) stated that when new technologies were introduced in market and if consumer categorised that product has shorter life cycles, the adoption rate slower than expected. Meanwhile, Magrath & McCormic (2013) stated that there are some factors that may influence the person such as time and software limitation and diverse motivation that discourage smartphone users to maximise the usage of smartphone technology. Apart from that Irby & Strong (2013) argued that educators should develop significant learning prospects for students to understand and accept mobile learning technology and its effective implementation in college and university level.

Smartphone technology appears to be the next stage of the ICT (Information and Communication Technology) revolution, especially in the areas of benefits that are derivable from mobility and wireless technology (Kirilov, Shmorgun & Lamas, 2011). Reilly & Duane (2010) also noted that smartphones could become valuable and a critical business tool for the effective and efficient delivery of extended list of information processing and other attendant functionalities. For example, managing personal time schedule, accessing internet contents, social networking, utilizing location-awareness function, and many other exciting applications which are meant to enhance the user's needs, thus eliciting phone-use satisfaction.

Dilanchian (2009) asserted that, in the near future smartphone technology will serve education, emergency services, defence, health, banking, retailing, and other sectors benefiting from informatin services. Today, there exist a huge number and great variety of smartphone application that make user easily alter the purpose of

their devices by adding new functionalities, that support users in different activities, e.g. banking, navigating, playing games, taking notes, or sightseeing that makes smartphone users easily make use of their phone as camera, musical instrument, sketchbook, dictionary, or bus schedule (B¨ohmer & Kr¨uger, 2013).

Nowadays, smartphone technology adoption among Malaysian has been flourishing. According to the statistical report of Malaysian Communication and Multimedia Commission (MCMC) over 14.561 million people subscribed to the use of 3G in quarter one of year 2012 compared to 10.335 million subscribers of the same quarter in 2011. Moreover till end of 2013 the quarter four report shows that total 18,029 million subscribers was recorded, this indicating that smartphone was monopoly the Malaysia market. According to International Data Corporation (IDC) the growth demand for smartphone in Malaysia was due to the increasing popularity of Android handsets and decreasing price of smartphone (Bernama, 2012).

Basic Phones	**Enhanced Phone**	**Cellular PDA**	**Smartphone**
Suited to voice and text messaging	Support voice, more advanced data calls and basic internet browsing.	Data-centric device but also can function as mobile phones.	Advance voice and data-enable devices, intended for consumer and business users.

SMARTPHONE INNOVATION

Figure 1.0
How Smartphone Different from Other Mobile Device
Source: Adapted from Key issues for Mobile Devices, Gartner (2009)

1.1 Problem Statement

Surprisingly, there are very little empirical research aimed to identify the smartphone technology have been done in Malaysia (Daud, Awal, Bakar & Osman 2011; Mokthar *et al*., 2013; Osman, Sabudin, Azlan, & Tan 2011; Suki 2013). It also challenging to find out the information from previous study about what factor influence the intention to acceptance of smartphone technology among university students in Malaysian context. Therefore, thus this study empirically analyses to determine the acceptance of smartphone technology among Universiti Utara Malaysia students.

Hu & Allison (2010) argued that the use and ownership of mobile devices have not achieved the tipping point of mass adoption. Moreover, there some prior studies which found out that consumers are not satisfied with current smartphone model and they complained about the disadvantage of smartphone features such as small keypad, small screen and lower resolution (Park & Yang, 2006; Siau & Shen, 2003). Rondeau, (2005) pointed out that when a new smartphone is introduced, the new functions seems to make more complex to be used and the price of smartphone also increased. Therefore, it is important to identify the effect of perceived ease of use on perceived usefulness of smartphone technology.

Sim & Kim (2011) asserted that students are highly addicted to smartphones that makes them cannot concentrate in class. Irby & Strong (2013) disclosed that students show low level of interest to participate in a new and possibly challenging mobile learning as they have low level of self-efficacy skills and their negative

perception towards mobile learning as difficult task that should be increased. Osman, Sabudin, Azlan & Tan (2011) found that students are not confident to store sensitive information (e.g. Bank password and email password) in their smartphones. Moreover, Karlson *et al*., (2010) stated that multi usage of mobile device such as communication and entertaining tools make them feel frustrated because all task cannot be easily carried out on mobile device due to lack of support and it drives user to complete their task on desktop. Therefore there is a need to examine the relationship of perceived ease of use in attitude towards smartphone technology.

Jones & Heinrichs (2012) state that students view their smartphones as simple communication device. In supporting that, Woodcock, Middleton & Nortcliffe (2012) stated that most students do not have strong connections for themselves between their personal smart phone as they only use smartphones to fulfill their needs and they do not have intentions to access further applications that exist on their smartphone. Moreover, Morgan (2010) claimed that if smartphone users are not active in social networking, the level of smartphone usage for social needs will drop dramatically. Thus, there is a need to examine the mediating effect of perceived usefulness in relation to perceive ease of use and attitude towards smartphone technology.

Wang, Huang & White (2013) state that desktop user feel more challenging when switching from desktop to mobile phone because typing and searching information on mobile phone are likely to be more difficult due to restricted typing area and limited internet speed of smartphone. Hamka & Bouwman (2012)

conveyed that understanding customer characteristic and behavior in market is not a simple task because sometimes, the deepest motivation of customer themselves will influence their decision making in purchasing a product or service. Magrath & McCormick (2013) argued that smartphone consumers do not have the same motivations, expectations and behaviours as the online consumers due to differences of mobile and laptop screen size and internet speed issues or even location usage. Therefore this research is aimed to investigate the relationship between attitude towards smartphone technology and behavioural intention of smartphone technology.

Ziefle & Bay (2006) state that male and female have different satisfaction, decision, attitude and confidence toward smartphone. In supporting that, Mak, Nickerson & Isaac (2009) state that the smartphone acceptance between male and female can differ based on gender, age, experience and education. Meanwhile, Kotler & Keller (2009) mentioned that men and women has a different shopping behaviour and this is because men are more passive on showing interest towards purchasing a product whereas women tend to easily purchase a product without knowing its proper information. Kertajaya, (2003) argued that men and women has different purchase decision making, even if they deal with the same things which may lead them to behave differently when buying the product or service. Wang *et al*., (2009) found that there has been limited research have done in gender differences that affecting the intention to accept smartphone technology acceptance. Thus this this study attempts to fill these gaps by examining the relationship between attitude and behavioral intention by using gender as moderator.

1.2 Research Questions

1. What is the relationship of perceived ease of use in attitude towards smartphone technology?
2. What is the relationship of perceived ease of use and perceived usefulness?
3. What is the mediating effect of perceived usefulness on the relationship between perceived ease of use and attitude towards smartphone technology?
4. What is the relationship between attitude towards smartphone technology and behavioural intention of smartphone technology?
5. What is the moderating effect of gender on the attitude and behavioural intention of smartphone technology relationship?

1.3 Research Objective

1. To examine the effects of perceived ease of use and attitude towards smartphone technology.
2. To determine the relationship of perceived ease of use and perceived usefulness.
3. To investigate the mediating effects of perceived usefulness on the relationship between perceived ease of use and attitude towards smartphone technology.
4. To investigate the relationship between attitude towards smartphone technology and behavioural intention of smartphone technology.
5. To investigate the moderating effect of gender on the attitude of smartphone technology and behavioural intention of smartphone technology relationship.

1.4 Significance of The Study

This study provides a clear and accurate empirical underpinning on the acceptance and intention derivable from university students who use smartphone technology in Malaysia. The outcome of this research effort provides the clear explanation of use of smartphones technology specifically among UUM students. Furthermore, this study attempts to answer the research question through examination of existing literature about the smartphone technology acceptance within the Malaysian context. For the smartphone developers, they can gain insights for new service opportunities through understanding the converging and diverging relationships among behavioural intention based on the attitude towards using smartphone technology. This is owed to the paucity of research in this regard.

Also, this research help the smartphone manufacturers and retailers to know under which condition was influence the smartphone technology acceptance among university students in order to optimize their marketing strategy. This research provides clues to the smartphone producers and mobile apps developers to have an in-depth understanding on how the perceived ease of use and perceived usefulness contribute to the attitude towards smartphone technology among the (UUM) students. This activity clearly enhances the strategic capability of management of smartphone application services.

Furthermore, by illuminating the moderating effect of gender towards smartphone technology, this study helps give us a clear view toward, what factor drives Malaysian students intention to accept smartphone technology. For the

academician, this research provides clear information about behavioural intention of smartphone technology between male and female. Furthermore, the findings of this research can serve as a contribution for the factor that influence of gender characteristics towards smartphone technology.

The findings from this research used as reference in future studies by researchers to gain better understanding on smartphone technology acceptance among Universiti Utara Malaysia students. Moreover, the data and findings of this research guide researchers to improve their level of understanding of the relationship between perceived usefulness, perceived ease of use and attitude towards smartphone technology within the Malaysian context.

The outcome of this research is hoped to provide a clear picture on to what the extent the use of smartphone technology among (UUM) students are being used. We believe that this research provide explaination on smartphone technology that highlight on the complex and evolving ways in which users accept the smartphone technology. The main contribution of the work is believed to be a important in helping us to understand about the measures of behavioural intention of (UUM) students towards smartphone technology.

1.5 Scope of Study

Scope of this research is the final year Malaysian and all post graduate students across the colleges in the Universiti Utara Malaysia, namely, College of Arts and Sciences (CAS), College of Business (COB) and College of Law, Government and International Studies (COLGIS). This group is to be studied

because they are perceived to be mature and going to real job market soon. This gives them the purchasing power on deciding any type of phones they want to use. So it is imperative to test them to know what contributes to their decision about using smartphone technology.

In view of the above and in support for the scope of this study, the technology acceptance model (TAM) is being used to investigate attitude and behavioural intention of smartphone technology among (UUM) students. In addition, this study tries to examine TAM in terms of its ability to predict user acceptance of smartphone technology among students. Furthermore, in addition to the body of knowledge, this study hope present a clear description of smartphone technology acceptance among (UUM) students that help the researchers to understand the technological, psychological and institutional factor towards smartphone acceptance among Universiti Utara Malaysia (UUM) final year students and post graduate students.

This research will add value to current body of independent and dependent variables that specifically remind future researchers that potential adoption of (UUM) students toward smartphone technology by eliminating extraneous information about human nature. The findings of this research model are used to design strategies to guide smartphone developers to planning adoption of smartphone technology among (UUM) students.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter begins by presenting a review of literature on the technology acceptance model (TAM) which was initially established by Davis in 1986. It also critically examines the empirical studies on perceived ease of use and perceived usefulness, attitudes and behavioural intention as it relate to smartphone technology. Furthermore, an in-depth review of the independent variables and a possible mediation selected for this study is also done.

2.1 Justification of (TAM) Model

Davis (1989) developed Technology Acceptance model (TAM) to assess the problem of user's unwillingness to accept new technology. He stated that "because of the persistence and importance of this problem, explaining user acceptance has been a long-standing issue in MIS research" (Davis, 1989, p.319). Among many reasons why this study used TAM variables as a research framework in the context of the investigating smartphone technology usage is due to its relation with the adoption behavior as it can be processed easily and provides a better understanding of the relationship between variables used in previous studies (Amin, 2007). In addition, TAM is one of the most influential models that have been widely used in studies of the determinants of information using system (Ramayah *et al*., 2009). Furthermore, Mathieson (1991) found that TAM has the ability to explain the adoption behaviour towards using information system compared to other models TPB, TRA and DOI.

Another major advantage of TAM over other models is that the two related beliefs of perceived usefulness and perceived ease of use can be manipulated and generalised across different settings (Chang & Hung, 2004). Previous studies revealed that TAM is successful in predicting whether the system is accepted or rejected by the users and it offers cost effective tool that can be used to evaluate the system design and its life cycle (Dillion & Morris, 1997).

The perceived ease of use and perceived usefulness give more weight to understand the core working of (TAM). Additionally, Davis explained the perceived usefulness where people like to use a system if they believe that it's important to them and can help them to perform their duty or work effectively. On the other hand, perceived ease of use also explained that, if a person is using a particular system that system must be simple, easy and understandable with an effort at all cause.

The variable in (TAM) are used by many scholars in various field as a purpose to measure utility and usability that influenced technology acceptance that determine how users apply that technology in specific task (Stern, Royne, Stafford & Bienstock, 2008). Nielsen & Mack, (1994) define usability as how easy to learn, easy to remember and efficient to use a system is. Basically, TAM is used to measure general belief of usefulness and ease of use towards the technology that explain intentions to use that technology (Baaren, Wijngaert & Huizer, 2011). Legris, Ingham, & Collerette, (2003) stated that TAM is empirically demonstrating user usability of the technology and it can predict 40% of technology acceptance towards any system in use and also the effect of technology in use. Baaren, Wijngaert & Huizer (2011) pointed that TAM model can be used as indicator to measure future adoption of end-user by using usefulness and ease of use variable. Choi, Park & Park

(2011) claimed that TAM created in purpose to predict user intends to use a product or label that involves pre-step process to connect with final actual use.

2.2 Empirical Studies on Attitude Toward Smartphone Technology

Ajzen & Fishbein, (2005) define attitudes as the way an individual positively or negatively responds and is disposed towards an object**.** Lane & Manner (2012) have done a research on identifying what type of personality that is more attracted by user towards certain types of smartphone application and at the same time they also examine how these information can be used by the marketer to promote and sell their application. Finally, they revealed that every person choose the smartphone applications that are matched with their personality and individual differences. On other hand Ha, Yoon & Choi (2007) have done a research on Mobile Broadband Wireless Access technology-based (MBWA) games to predict users' adoption and in their research result, it was concluded that perceived enjoyment influenced the individual attitude while perceived usefulness did not affect totally towards MBWA.

Liang, Huang Yeh & Lin (2007) found that location and time pressure play roles as moderation effect towards attitude which influenced users' intention to use mobile value added services. Rohm, Gao, Sultan & Pagani (2012) did a research to investigate the consumers' attitude towards mobile marketing and their main focus is to identify young consumers' attitude and their actual activity towards mobile marketing. They found that perceived usefulness, personnel attachment and consumer innovativeness have direct influence on attitude towards mobile marketing.

Meharia (2012) used TAM model to explore how the external variable such as security, availability, confidentiality, privacy and processing integrity of smartphone affect attitude towards using mobile payment system (MPS) among india consumer. At the end of the study, she conclude that attitude towards using MPS was determined by intention to use that system in India. Liang & Yuan (2012) try to identify what the main factor influences purchase intention of China consumer to use smartphone, at the end of the research they revealed that the smartphone features such as quick internet access, large screen and fastest operating system contributed the China consumers to have positive attitude on smartphone. Basically, smartphone device is equipped with various software and applications which allows the smartphone users to interact with others without geographical limitation (Carayannis, Clark, & Valvi, 2012). Hamka & Bouwman (2012) stated that mobile phone technology and its functions become more integrated with the mobile user's social life which also influences their consumption behavior.

2.3 Attitude Towards Smartphone Technology

Mitchell & Olson (1981) did a research on how the advertising effect towards brand attitude. In their findings, they concluded that belief and attitude play the roles as mediator effect on brand attitude but Maio & Haddock, (2010) argued that attitude was a reflection of both negative and positive reactions in the psychological science. Teo, Lee & Chai (2008) postulated that at the beginning most scholars try to examine the topics related to information technology and they reported that attitude is an important factor to determines success of any system.

Smartphone functions are comparable to the computer, in a way that it is powerful enough to deliver extended list of information such as accessing the internet and managing personal time schedule (Osman, Sabudin, Azlan, and Tan, 2011). Davis, (1989) stated that user would have positive attitude toward the system if they realised that system is useful and easy to use.

Putzer & Park (2012) also postulated that if user has positive experience by using smartphone, it will lead to an increase in the adoption rate of smartphones. The different characteristics of smartphone features that are available in market nowadays create multiple choices and intentions among smartphone users in adopting various types of available smartphones (Kang, Cho & Lee, 2011). The dual purpose of smartphone that includes personal computer and contemporary mobile phone functions makes demand for smartphone increase drastically and shows growing number of smartphone users (Hahn, 2010). To add, the success of any educational programme is strongly depended on attitude and involvement of teacher to implement that technology to fulfilling their student needs (Askar & Umay 2001). Moreover, there are a many smartphone has built on a mobile computing platform that equipped with a more advanced computing ability and connectivity while other modern smartphone that available in market equipped with digital camera high speed data access via Wi-Fi and GPS navigation these advantage has brought physical and psychosocial problems to the modern society such as internet addiction (Porter., 2010).

With life charting from smartphone to social networking such as MySpace, Facebook and Twitter encourage smartphone users to stay connected with groups of friend (Morgan, 2010). Sonnenwald, Maglaughlin & Whitton (2003) claimed that if a user found importance of the technology, it will indirectly influence innovation adoption. Besides, Olla & Choudrie (2009), suggest that every organisation needs a mobile strategy to plan ahead and start integrating mobile applications and services into every level in society. Katz & Sugiyama (2005) stated that smartphones changes people's way of life in many ways. For example, smartphone users can access information online at anytime and anywhere. They can chat with friends anywhere through social network platforms as long as there is connectivity and the other smartphone users are available online to also access this platform on the smartphone. Baaren, Wijngaert & Huizer (2011) put their view of point that TAM approach is used not only to explain contemporary attitude towards adoption of technology but also to describe decision of adoption of that technology.

Attitude is formed as individual normative believes that lead to particular outcome and evaluation (Mosavi & Ghaedi, 2012). Mobile technology has become a powerful device as it has been quickly adopted by most people and it has also become a part of their daily life and these devices also replaced several tasks that normally should have been done by using a laptop (Dawabi, Wessner, & Neuhold, 2004). Based on the foregoing, it can be implied that advanced application in smartphone device make the user feel the comfort in using it and they totally rely on smartphones technology.

Pitafi & Farooq (2012) defined attitude as the degree of positive or negative behaviour associated with some psychological object. Roßnagel & Zibuschka (2011) believe that the emergence of powerful smartphones have become integral part of our daily life. This powerful device is intended to satisfy the user by providing high resolution digital camera, internet connectivity and as a communicating device (Chen, Park & Putzer 2010). According to Ajzen (1991), attitude is the degree to which a person has a favourable or unfavourable appraisal or evaluation of the behaviour in question. Therefore, in this study, attitude defined as an individual level of consciousness towards a positive or negative attitude that is expected to elicit or expose their actual behaviour.

The growing demand for the smartphone industry over the years has contributed to the continuous improvement towards improving powerful mobile processor that operate similar to small computer with larger screen and large memory to fulfil consumers' demand (Pitchayadejanant, 2011). In support this, Daud, Awal, Bakar & Osman, (2011) noted that the smartphone and tablets devices which are currently in vogue are equipped with larger screen with high definition of graphic and high processing speed that equate to the performance of personal computers. In view of the above, it can be conclusively noted that, as a result of drastic development in smartphone technology, there has been a rising influence of diffusion of variety in the operational system which increased the demands of smartphone among consumers.

Lane & Manner, (2012) found that "Big five Inventory" had influenced smartphone application usage. The five traits are extraversion, conscientiousness, agreeableness, neuroticism, and openness. McElroy, Hendrickson, Townsend & Demarie (2007) also stated that extraversion person have certain characteristic such as excitement and the urge to seek out new opportunities and being optimistic. The extraverted play moderate role between subjective norm and intention to use that technology (Devaraj, Easley & Crant, 2008). Moreover, conscientiousness reflects the self-control, strong will and deliberated in individual personality (McElroy *et al*., 2007). Devaraj, Easly and Crant (2008) found that conscientiousness poses relationship between perceived usefulness and intention to use toward technology. Moreover Devaraj, Easly & Crant (2008) stated that agreeableness positively has a relationship towards belief about the perceived usefulness of technology. However Ehrenberg, Juckes, White & Walsh (2008) found that neurotic personalities spend more time in text messaging and strong mobile phone addictive tendencies. Finally, the openness of individual normally like to seek new experience and willing to try new technology in market to get experience (Mccrae, Robert, Costa & Paul 1997).

Devaraj, Easly & Crant (2008) concluded that if a person has high level of openness, they are more likely to hold positive attitude towards accepting job-related technology in purpose to get new approach for their work. Users have a positive attitude towards a system or device if it is easy to handle and useful to the user (Park & Chen, 2007). Job relevance, compatibility, personal experience, internal and external environment influence users' attitude towards smartphone usage (Putzer & park 2012). Mak, Nickerson & Isaac (2009) divided the external variables into two dimensions; psychographic variables such as self-efficiency and demographic

variable such as education, age, gender and experience. Based on the above submission, it can also be firmly said that individual attitude is influenced by external variables that makes overall behaviour change.

Furthermore, Kim (2008) found that positive attitude in using mobile wireless technology among smartphone user was influenced by personal intention, social influences, ease of use, technology complexity and individual behavioural differences. Mason, Conrey & Smith (2007) in their study defined social influences as the way of individual personnel behaviour, feeling and belief were affected by other people's reactions. Zeal, Smith & Scheepers (2012) have done a research on social influence among mobile technology users and in the final outcome of research, they conclude that social influence played both negative and positive impact on individual adoption towards mobile technology. Davis (1993) stated that the main reason why most people like to adopt cellular telephone as business tool is due to social pressure and a source of enjoyment. However, motivation was identified as the main reason for early adoption of cellular phone. According to Yi, Jacson, Park & Probst (2006), earlier adopters are technically competent than adopters nowadays because the earlier adopter have the first-hand knowledge of new innovation.

Devaraj *et al*., (2008) found that perceived usefulness positively associated with attitude and belief toward accepting job related technology to improve their work. Different motivational dimension such as understanding of ability, ease of use and beliefs build trust towards smartphone application among smartphone users (Choi, Jung & Kim, 2012). Yan, Zhang & Deng (2012) stated that users' trust toward mobile application can be evaluated from his or her trust behaviour. McKnight,

Choudhury & Kacmar (2002) divided knowledge-based trust into three elements i.e. the ability of trustee to fulfill the need of trust or second trustee must act with interest of trust and finally trustee must be honest and promise keeping. From this, it can be deduced that the brain was manipulated by emotions and past information that affect attitudinal process. In a similar vein, Park & Chen (2007) stated that user's attitude was influenced by individual background such as job status and education level.

Yi, Jackson, Park & Probst (2006) state that if the person believe that by using a system will enhance their image and social status consequently they tend to categorised that system in perceived usefulness. The willingness to learn new knowledge and innovativeness behaviour among several consumers make them try new technology that leads to creating positive impact towards attitude (Ling & Yuan, 2012). Scarborough & Zimmerer (2000) pointed that early introduction of any new technology was divided into three stages which are substitution, adoption and revolution. In substitution stage, people are using newly introduced technology in market to implement the same task more effectively while second stage people can do new things by using that new technology and at the final stage, all users use new technology to the new ways. These cycle shows that maturity of innovation towards the technology was decreased when users are equipped with essential skills and confident. Pitchayadejanant (2011) asserted that the smartphone device offer advanced computing ability to fulfill users' requirements in improving their job performance. Many scholars postulated that attitude plays an important factor in affecting success of any system (Teo, 2010).

Grainger & Tolhurst, (2005) found TAM that was used by scholars to measure the effect of using computer, attitude was reported as a very responsive to the influence to the organization such as motivating staff, positive methos and caring staff. There are two types of influences that may impose positive or negative attitude towards the technology by user where these influencers come from social influence like friends, peers and relatives (Quiring, 2006).

Teo, Lee & Chai (2008) asserted that the success of computer use among teacher largely depended on their attitude and willingness to accept computer technology in teaching and learning. Besides Shapka & Ferrari (2003) claimed that if the teachers have positive attitude towards computer, it will influence them to use it efficiently for teaching.

Ajzen & Fishbein (1980) asserted that individual believe was the main factor to determine good and bad attitude. As for example, the person who has positive outcome from a system will lead he or her to the positive attitude towards using that system. Yang & Howland & Moore (2002) found that if students show positive attitude towards web based courses, it will lead them to easily understand the course content and student will posses self-learning attitude.

The purpose of this study in applying the Technology Acceptance Model (TAM) is to investigate smartphone technology attitude within UUM final year students and postgraduate students. This study is carried out to further expand and contribute to the body of knowledge of Technology Acceptance Model (TAM) by Davis (1986) which is the physiological model that is used to examine users'

adoption towards new technology. Also, Hong, Thong & Tam (2006) submitted that the TAM is widely used by scholars to predict continuing usage behaviour of experienced user.

2.3.1 The Notion of Attitude

In addition, most previous researches show that attitude have significant relationship with behavioural intention (Auter, 2007; Jongepier 2011; Osman, Sabudin, Azlan & Tan 2011; Susick, 2011). Gawronski (2007) stated that there are several factors that automatically influenced attitude and which are motivation and evaluation of characteristics. According to Castañeda, Mun˜oz-Leiva & Luque (2007), perceived usefulness are more related to extrinsic motivation while perceived ease of use was linked with intrinsic motivation. Daniels, (2000) proclaimed that Abraham Maslo's theory was created to motivate every human through internal and external desire such as psychological comfort, safety, love esteem and self – actualization. Davis *et al*., (1989) believed that perceived ease of use and perceived usefulness are derived by external variable such as individual ability and situational constraints.

Petty & Briñol, (2006) argued that attitude is constructing from evaluation of old and new information that are existing in our memory. However, Hello, Scheepers & Sleegers (2006) have done a research based on racial attitude and they found that people will have lower level of racial prejudice if they are from higher level of education background. Yan, Zhang & Deng (2012) asserted that trust plays most important role towards the usage and application consumption and it is simply because trust helps users to overcome uncertainty perception and risks. Chaudhuri & Holbrook (2001) found that consumers' brand trust is closely related to behaviour

intention and attitudinal loyalty. Hassan *et al*., (2011) asserted that individual usage behaviour can be influenced by belief and attitude. Nambisan & Baron (2007) also added that experiential values derived by aesthetic, service excellence and playfulness that generated from the inner personal had influence users' perception and attitude in certain extent.

2.3.2 Classification of Attitude

Greenwald & Banaji, (1995) classified attitude in to two different measurements and they are implicit and explicit attitude. Fazio, Jackson, Dunton, & Williams, (1995) argued that implicit and explicit measurement only represent the attitude differences that control the participants' responses.

Mao & Plavia (2006) found that implicit factor influenced the information technology (IT) acceptance among Chinese workers. Arning & Ziefle, (2007) stated a concrete evidence in their research that external variables had influenced the relationship between system performance and technology acceptance. Zimmermann, (2011) asserted that positive and negative offshoring attitude would influence other nationality colleague's student and they become salient. Kim, (2008) claimed that if people with different nature of job were exposed to external information, it will eventually become a primary reason which influences their attitude towards choosing which technology they want to use. There are several external factors that make consumers to adopt positive attitudes towards smartphone such as smartphone can access internet quickly than traditional mobile phone made enjoyable experience among smartphone users (Ling & Yuan, 2012).

Prensky (2001) argued that enjoyment is the most important factor to motivate the people. Solomon *et al*., (2006) classified attitude into three components; affect, behaviour and cognition. Affect refers to the way an individual feels towards particular object. Malhotra (2005) stated that behaviour represent customers' intention to do something that are influenced by attitude and cognition and it was referred to the belief of that person towards an object that can easily controlled by a person.

2.4 Perceived Ease of Use

Perceived ease of use is defined by Davis (1989, p. 985) as the degree to which a person believes that using a particular system would be free of effort. Perceived ease of use is further defined as the degree where the users believe that using specific technology will reduce the difficulty of handling work and at the same time it will help to improve the users' performance (Kang, Cho & Lee, 2011). Kim & Kang (2012) stated that and can print digital document from Personnel computer. Teo, Lee & Chai (2008) postulated that if there is a higher adaptation of education technology in education sector, it will indicate to the increase of perceived usefulness in education sector that is more likely to increase students' attitude positively towards that technology as perceived usefulness have directly influenced the attitude.

Anetta *et al*., (2012) noted that early studies on smartphones only focused on the applicability of smartphone technology in diverse fields and its adoption process. For example, Dickinson, Ghali, Cherrett, Speed, Davies, & Norgate (2012) studied on smartphone usage and satisfaction in the tourism industry; Susick (2011) did a research on mental illness treatment using smartphone application; Cheng & Wang

(2010) done a comparative study of consumer acceptance of mobile-commerce; Kim & Kizildag (2011) explored the use of M-learning to utilise hotel training and Koenig-Lewis, Palmer & Moll (2010) predicted mobile banking adoption among young people in Germany.

Kwon & Chidambaram (2000) conducted a research on identifying cellular phone adoption among Hawaii citizens by examining cellular phone owners usage pattern, socio economic characteristic and their motivation factor to use cellular services. Finally, they assumed that perceived ease of use has significant effect on user extrinsic and intrinsic motivation towards cellular usage. Davis, Bagozzi, & Warshaw (1992) stated in their studies that perceived usefulness was the extrinsic motivator while enjoyment is the intrinsic motivator such as fun. Venkatesh & Davis (2000) found that perceived ease of use was the main instrument that plays the main role in determining the internal and external control of individual.

Empirical studies have suggested positive relationship between perceived ease of use and smartphones technology does exist. For example, Park & Chen (2007) did a research to investigate what motivates smartphone adoption decision among medical doctors and nurses and they also used technology acceptance model TAM to test reliability and validly of the hypothesis model. Finally, they stated that perceived ease of use has positive relation with perceived usefulness to determine attitude towards using smartphone. In a similar vein, the submissions of Venkatesh & Davis (1996) implied that hands-on experience has significant relationship towards perceived of use on that system. A mobile phone user will have a different experience by using multiple types of mobile devices that exposed different opinions

in ease of use towards mobile devices. Castañeda, Mun˜oz-Leiva & Luque, (2007) stated that different level of users' experience will produce different results especially in different modelling perspective. Reneau (2012) conducted a study to examine adoption, rejection and diffusion of smartphone among senior community in America. The researcher discovered that perceived ease of use had significantly influenced the adoption and rejection of smartphone among senior community in America.

Van der & Heijden (2004) found that perceived ease of use and perceived enjoyment play strong determinants towards the intention to use hedonic information systems. Wang, Wu, Wang & Yuan, (2009) did a research on the relationship between mobile learning adoption and self-efficiency. In the outcome of the research, they state that the level of users' experience with mobiles will influencs their perception and ease of use of mobile learning. Yi, Jackson, Park & Probst (2006) had done a research on PDA (Personal Data Assistant) acceptance among healthcare professionals. From their research, they stated that physician perception of internal and external control had lead to the ease of use and intentions towards particular innovation. Alshare, Grandon, & Miller, (2004) have done a research to explore internet usage differences between male and female and at the final outcome of research, they stated that perceived ease of use strongly affect female students compared to male students.

Al-khateeb (2007) found that perceived ease of use plays most influential factor among Chile student. Kim & Kang (2012) also claimed that perceived ease of use has direct influence on usage intention among Korean's mobile banking although

there are some studies argued that perceived ease of use has no significant effect towards the usage intention (Kwhk & Lee, 2005; Lee, Kwhk & Whang 2006). The innovation diffusion theory was introduced by Roger (1995) and in that theory, he asserted that when innovation brings benefit to the technology, it will sooner or later increase the ease of use towards that technology and at same time it will influence the adoption decision towards that technology.

Arning & Ziefle, (2007) has stated that perceived ease of use was influenced by differences in age and gender which contributes to variable confidence among individuals. Therefore, we can assume that age and gender are the two important constructs in the operationalization of users' behaviours towards smartphones technology. Wu & Wanga (2005) asserted that in M-commerce, perceived ease of use was influenced by attitude towards cost of mobile phone usage. Venkatesh & Morris (2000) found that women are more likely to get detailed information about perceived use of the software before they make purchases and possible usage.

Teo, Lee & Chai (2008) did a research among pre-service teachers to identify their view on usefulness of computer in education sector and finally they concluded that perceived ease of use determine intentions to use computer among pre-teachers that if the computer is easy to use, the teachers prefer to use it meanwhile if they do not know how to use the computer, they think that it is useless. Dash, Mohanty, Pattnaik, Mahapatra & Sahoo, (2011) used perceived ease of use and social influence as predicting variable to determine consumers' behaviour towards public and private internet banking in India. Finally, they found that perceived ease of use and social influence strongly influenced the adoption of internet banking among Indian

consumer. Auter (2007) asserted that social influences are one of the factor that influenced consumer on the intention buy and dependency on smartphones.

Perceived ease of use is the salient driver that influenced the intentions toward high-utilitarian technologies (Xu, Lin & Chan, 2012). Kim & kang, (2012) asserted that perceived ease of use has direct effect on attitude towards the use and perceived usefulness works as expectation effort and there is no need to use the system. Koufaris (2002) stated that if a user evaluated a system is more in-depth way, they would use perceived usefulness to gain experience.

Castañeda, Leiva & Luque (2007) declared that in the case where users with high experience of using internet or visiting websites, the influences of perceived ease of use on attitude towards using website is smaller than users with low experience of using internet. This is because different individuals have different evaluation of website from different perspectives that is merely influenced by extrinsic motivation. Yi, Jackson, Park & Probst (2006) argued that earlier adopters should consider the complexity of technology to reduce troubles that will then help the adopter nowadays to be more easier to find the significant influence on perception of perceived ease of use. This is because the earlier adopters are more aware of the importance of use of the technology and have the ability to recognize the benefits and advantages that are associated with innovation in its early stage of diffusion. Porter & Donthu (2006) found that low level educated background and old age persons have less perceived ease of use and positive attitude to use the internet. The growing demand on smartphone trend lead to new challenges in smartphone industries where increasing security threats to smartphone and virus attack due to the manifold technical possibilities of establishing connections trough (UMTS)

"Universal Mobile Telecommunications System", Infrared, Bluetooth and (W-Lan) "Wireless Local Area Network" from the smartphone device (Dörflinger, Voth, Krämer & Fromm, 2010). Apart from that, Panko (2010) identified four general type of telecommunication security threats i.e. malware (viruses and worms), attacks on individuals (e.g. credit card theft, fraud, phishing, identity theft, and spam), denial-of-service (using bots) and hacking (breaking-in).

Wu & Wangsa (2005) did a research on the factors influencing mobile commerce acceptance. In their research they used three variables to test the model which are the perceived risk, perceived cost and innovation diffusion theory. Finally, they found that perceived ease of use and cost of usage had directly influenced users' attitude on m-commerce. Lin (2011) did a study about mobile banking adoption among Taiwan bank customers. He concluded that perceived ease of use was positively significant with mobile banking adoption especially among experienced customers who benefit from mobile banking service.

2.5 Perceived Usefulness

Davis, (1989, p. 985) defined perceived usefulness as the degree to which a person believes that using a particular system would enhance his or her job performance. Kang, Cho & Lee, (2011) also defined perceived usefulness as the degree of the users believe that by using the new technology in his or her workplace, it will help to improve their performance and productivity to achieve organizational mission and objectives. Perceived usefulness refers to users' subjective assessment from the utility that offered by new technology towards specific task (Lee & Wan, 2010). Perceived usefulness is used to gather instrumental and informative information to understand the specific system or device (Choi, Jung & Kim, 2012).

On a similar note, Kleijen, Wetzels & Ruyter (2004) defined perceived usefulness as how far consumer believes on mobile service that can commit in to their daily activities.

Kim & Kang (2012) found that the usefulness of smartphone such as high processing speed with high-performance hardware and the ability to connect internet anywhere trough Wi-Fi (Wireless Fidelity) network and also larger screen size make smartphone banking easily be adopted by Koreans. Teo, (2010) found that pre-service teachers has positive point of view such as using computer will be useful in their daily task which significantly influence their attitude. Yi & Hwang, (2003) said that intrinsic motivation influences extrinsic motivation (perceived usefulness) directly via perceived ease of use that makes a person believe that using the technology to be useful. Chin, Marcolin & Newsted, (2003) stated that person use the technology for effective purpose for an example playing games, the fun of playing games makes the user tend to attach more importantly to perceived usefulness of high-utilitarian to that technology. Yi, Jackson, Park and Probst (2006) stated that if technology adopters have positive understanding in applying new technology and its implication on better advantage in their job, it will positively demonstrates that they have positive perception on perceived usefulness.

Chin, Felt, Sekar & Wagner (2012) did a research on measuring users' confidence in smartphone security and privacy and finally they found that participants are significantly less willing to perform certain task on their smartphone such as to make shopping purchases, provide their Social Security Numbers, access health data, or check their bank accounts on their smartphones.

In the research done by kim and Kang (2012) to examine intentions towards using smartphone banking among Koreans, the result showed that perceived usefulness and security risk had significantly affect the intention to use smartphone banking. Laukkanen *et al*., (2007) stated that mobile banking services include inquiry of account balance, bill payment and check transaction history through mobile device such as smartphone, PDA (personal data assistant) and cell phone. Yi, Jancson, Park and Probst, (2006) have done a research to examine acceptance of information technology among professional people in organization level and at the final result, they found that perceived usefulness was the main factor than perceived ease of use that influence professional people to use information technology.

Theng, (2009) found that mobile self-efficiency played most important roles in perceived usefulness towards using mobile devices that was influenced from prior experience using mobile devices. This was supported by Venkatesh *et al*., (2003) that users' experience was the main factor for an individual to adopt a technology. After reviewing many studies and scholars' argument, Castañeda, Mun˜oz-Leiva and Luque, (2007) concluded that perceived usefulness is suitable to predict intended system usage and this is because the motivation to use the system are considered as functional base while if the users found that technology was the non-functional then they will search for another technology to get new and pleasurable experiences. Moreover these studies do found that as the effects or relationship between perceived usefulness and attitude towards use of smartphones. For example, Mosavi and Ghaedi, (2012) proclaimed that attitude is the outcome of subjective estimation and not objective facts and through that process, evaluation of behaviour were shaped. Venkatesh, (1999) found that perceived usefulness plays the main key point that

helps to determine specific needs towards the technology and it also encourage positive attitude to use it. Yang and Zhou, (2011) stated that generally, consumers are more likely to pass marketing advertisement to their friend through e-mail only if they feel it was entertaining or useful.

Koufaris, Kambil and LaBarbera, (2002) argued that if a person with limited experience on using the system and user evaluated that to use that system requires super efficiency, perceived ease of use is being the stronger determinant of future intention to use that system than user who have well known to use the system. Yi, Jackson, Park and Probst (2006) predicted physician's intention to accept innovation, and as the result, it is proven that perceived usefulness played the most significant role in determining the physicians' intention to accept new technology.

Al-khateeb, (2007) conducted a research to predict the internet usage between Chile and Arab students. It was concluded that perceived usefulness was a good predictor of internet usage among them while perceived ease of use is not an important factor in predicting internet usage. Rovai & Childress, (2002) asserted that computer attitudes are influenced by perceived usefulness because if the teachers have the confidence towards computer, they will use computer in teaching. Meanwhile Kim & Kang, (2012) state that in TAM perceived usefulness has direct effect with attitude towards the use and behavioural intention that works to improve job performances.

Yuan, Archer, Connelly & Zheng,(2010) conducted a research on mobile work supporting functions in four contexts; location tracking, online job dispatching, notification and navigation. Finally, they found that perceived usefulness of mobile

notification positively match with mobile notification and job dispatching. Furthermore, they asserted that if users believe that location tracking and navigation function of mobile perceived to be useful, it would increase their dependency towards the mobile device. Yi, Jackson, Park & Probst, (2006) argued that opinion of important referent becomes the direct influencer towards the intention and feeling of the person that consequently affect individual perception towards the usefulness of the innovation.

Park and Chen, (2007) found that perceived usefulness is a stronger predictor of user attitude towards accepting innovation technologies and furthermore they found that this is the reason in the increase of the needs for more doctors to have intentions to use smartphones. Smartphone device is different from traditional phone it is because the functions of smartphone can expend constantly by installing new applications (Ling & Yuan, 2012).

Mao & Palvia (2006) has stated in their research that if new technology is user friendly, it will increase the perceived usefulness and the worker will have intention to use that technology to increase their job performance. Behavioural intention and attitude towards using smartphone are largely influenced by perceived usefulness (Putzer & Park 2012). Mourali, Laroche & Pons, (2005) studied on how interpersonal influences shaping consumers' choice decision among French and English Canadian. Finally, they revealed that interpersonal influence had contributed to consumers' decision making process by three factors i.e. value expressive, comprising and informational aspect.

Mosavi & Ghaedi (2012) divided consumers' intention into two categories in their research. Repurchase intentions and word-of-mouth intentions. Theng (2009) found that perceived usefulness has played most important role in mobile self-efficiency among students towards prior experience of using mobile phones. Lee and Wan, (2010) found that perceived usefulness helps to increase trust and adoption in purchasing e-ticketing among China travelers because the travelers believe that electronic ticketing system is effective and it can save time. Moon & Kim, (2001) asserted that perceived usefulness plays important task such as work related task e.g. entertainment oriented task.

Davis (1989) found that perceived ease of use had positively influenced behavioural intention of user to use the system. Furthermore, from the prior researches, we had found that the scholars show concrete evidence that there is a correlation between actual behaviour and behavioural intention (Venkatesh & Davis, 2000). Genova, (2010) stated that the usefulness of smartphone such as browsing the internet to get information, navigation device and entertainer make smartphone users becoming highly dependent on smartphone. Suki (2013) asserted that the speed of the internet connection at the university and the availability of Wi-Fi services are the important factors that affect the students convenience in using smartphone technology. Furthermore, he argued that academics and educational developers need to encourage the students to use personal technologies such as tablet PCs and smartphones to enhance their learning process.

Zarmpou, Saprikis, Markos, & Vlachopoulou, (2012) studied on adoption of mobile service among consumer. At the final outcome of their study, they concluded that innovativeness, perceived usefulness and relationship have stronger predictor towards behavioural intention in order to adopt mobile technology. From this, we can conclude that if users get benefits from the capabilities of technology, they will adopt that technology to get positive experiences.

2.6 Gender

Rijsdijk & Hultink, (2009) mentioned that multi-functional aspect of mobile devices such as speed and stability have significantly increased the users' positive perception and the relative advantage towards system performance and significantly enhance customer to pay special attention on overall evaluation of mobile technology (Gebauer *et al*., 2008). Furtheremore Singh & Goyal (2009) found that physical appearance of mobile device is highly valued by mobile handset users.

Entner, (2010) has done a research on smartphone ownership among American and Asians and from the research he asserted that 53% males are more likely to own smartphone than female users recorded as 47%. Furthermore, Horrigan (2009) stated that male are the largest group that uses mobile technologies in age ranging between 18 to 34 years old which was younger people. Moreover, Holbrook, (2000) asserted that customer decision making process towards purchasing any product was influenced by the contact fantasies, feeling and fun that create various shopping experience. Bruner, Kumar & Anand, (2007, p. 329) argued that gadget lovers (e.g., mobile phones and computers) are a specific type of adopter that might meet the requirements of both influencing others' opinions and being relatively early adopters of innovations.

Lin, Chan, & Xu, (2012) stated that female social network users have given high respond towards reading, writing and traveling activities and surprisingly they were more likely to blog compared to male users. Verkasalo, (2007) found that teenager are the most active group in capturing photos from their smartphone particularly teenage men ranging between 20 to 29 years old as they captured 127 photo in a month and male respondents in below the age 30 showed interest on designing while females show high interest towards arts. Verkasalo, (2007) has asserted that male teenager smartphone users spend 61 minutes in a day compared to female teenager that only spend 36 minutes in a day using their smartphones. The biggest age category recorded which maximally use the smartphone are in age ranging from 20 to 29 years old where they spend a minimum of 36 to 37 minutes in a day with their smartphones.

The research done by San, Osman, Sabudin, Azlan, and Tan, (2011) about consumer behaviour toward using smartphone in Malaysia revealed that male consumers give high response towards using various mobile contents such as games, application softwares, e-mail, and internet browsing compared to female consumers who showed more interest on purchasing ringtones and wallpapers which are meant to decorate or personalize their smartphones. Busk (2010) stated that basically guys are the first owners of new technologies and gadgets, and after a period of time the women tend to follow. Castell, Fernández-Ardèvol, Qiu, and Sey, (2007) (p. 46) stated that "the mobile telephone has changed from being gadget for guys into being more of a social networking tool for girls". Moreover Turner, Love and Howell, (2008) found that female mobile phone users are more likely to use their mobile

phone at public places than male users. Sieger and Moller, (2012) did a research on gender differences in mobile security and at the final outcome of the research, they found that female has higher perception on mobile security than male user. On other hand Vankatesh, Morris & Ackerman, (2000) found that perceived usefulness was the major factor among men towards the adoption of new software system and this is because men are more focused on effectiveness of software without considering risk.

According to Castells *et al*., (2004), females not only used their mobile phone as a fashion item but also as a key channel to maintain their personal relationship while their counterpart men showed high respond to use their mobile phone for instrumental purposes. Furthermore, they stated that in terms of communication and social networking, women were still higher than men but however men are higher than women in the usage of application on mobile phone. Smartphones offers a new opportunity by providing convenient and easily accessible information about business practices to consumers at the point of purchase (Watts & Wyner, 2011).

Venkatesh, Morris & Ackerman (2000) explored the relationship between male and female towards technology usage by using subjective norm, perceived ease of use and perceived usefulness as mediator to examine the subject and they found that perceived usefulness has strongly affected male user towards technology usage while perceived ease of use affects more on female users. In a study done by Osman, Sabudin, Azlan, & Tan (2011), it was found that Malaysian male and young consumers are generally greater target market by software developer to promote smartphone games and applications. The emergence of advanced mobile internet

technologies makes the smartphone a new marketing platform for retailers and manufacturers (Bakış, 2008).

2.7 Behavioural Intention

Behavioural intention was introduced by Fishbein & Ajzen, (1975) from Theory of Reasoned action (TRA). Behavioral intention was defined as the degree of positive or negative feelings that people hold on performing specific activities and how sure they are regarding the result of those activities (Davis, 1989). Davis also postulated that behavioural intention is used to predict actual usage of person towards specific technology or device. Irani, (2000) stated that TAM model are well known influential theory that is used to predict and understand behaviour and behavioural intentions. There are few studies which showed that past expectation, regret and satisfaction influenced behavioural intention independently (Tsiros & Mittal, 2000; Yim *et al*., 2007). Satisfaction particularly refers to effective response of a person before and after use towards targeting object while regret refers to the comparison process between object and its alternative where a person feels disappointed when new outcomes do not meet their expected performance and they will regret that new outcomes are worser than forgone outcome and this situation will reduce satisfaction level of a person towards that object (Kang, Min, Kim & Lee, 2013).

There are few number of research have been done by scholars in examining behaviour on mobile industry. As for example, Kivi (2007) did on mobile user behaviour and service usage, Verkasalo & Hämmäinen (2007) carried out a research about measuring mobile service usage, Kim (2008) executed a research on

individual behavioural intention to use mobile wireless technology, Kang, Ming, Kim & Lee (2013) worked out on users behaviour in social networking sites, Suki (2013) did on students' dependency on smartphone influencing their purchase behaviour. On the other hand Josias, et. al, (2012) did a research on smartphone application usage among south African university student and based on the discussion they had found that too much social networking site (SNS) interaction negatively affected student studies and student also show low level of interest toward M-learning. Hamka & Bouwman (2012) declared that the penetration of smartphone in the developed world has changed the users' daily lives as the smartphone users spend most of their time by interacting using their phone and dealing with smartphone application.

Kotler, (2003) divided the characteristic of customer behaviour into four and they are cultural, personnel, social influence and psychological factor. The cultural refers to when a person is exposed to behaviours, preferences, and perceptions which held through his or her family, institution or neighbourhood which then become the foundation of cultural value. Personnel status refers to status of individual such as young, single, married, divorce or a person's education and monthly income play important role in shaping consumers' behaviour and help them to choose the right product or service. Moreover, social influence refers to the relationship with reference group which has direct or indirect influence on person's attitude or behavior. In other words, his or her status in society affects their behaviour and lifestyle. Psychological factors were influenced by motivation, perception, learning beliefs and attitudes influenced consumers' buying behaviour.

Kuhlmeier & Knight (2005) asserted that consumer will heavily depend on smartphone because of past experience which had influenced their future purchase behaviour. Consumer has higher purchase intention when they believe that mobile application is designed to enhance user experience that lead to trust and satisfaction. Park and Chen (2007) investigated smartphone adoption decision among medical doctor and nurse. The result of study indicates that behavioural intention significantly influenced perceived usefulness on attitudes toward using smartphone. Morris *et al*., (2009) asserted that attitude is the efficient predictor of behavioural intention in variety of contexts including work related behaviour. Fishbein & Ajzen, (1975) stated that external stimulation like social effect directly influenced individual behaviour and indirectly affected their behaviour to use certain technology.

Porter & Donthu (2006) claims that race, income, education and age differences drive consumer belief towards internet usage. Yang, (2005) found that past adoption behaviour, consumer innovativeness, technology cluster adoption, age and gender affect Singaporean adoption behaviour towards M-commerce. Rice & Katz, (2003) found that education background has significantly influenced mobile phone and internet usage as mobile phone user are more educated than internet users. Zhou, (2011) pointed that the success of any mobile viral marketing depends on the attitude and actual behaviour of message recipient towards forwarding marketing message to their friends and relatives as that is important to marketing researcher to rethink and understand consumers' attitude to success in mobile viral marketing.

Brandenburg and Katharina (2012) have done an experiment on the impact of prior knowledge towards multi-touch interface with three group i.e. adult participant with and without prior knowledge and children and finally they revealed that different levels of prior knowledge lead to different types of intuition behaviour. Fogg, (2003) stated that information technology can influence people to change their attitude or behaviour. On the other hand, early adopters' enthusiasm towards justifying new products especially new gadgets are significantly influenced by individual's learning and buying behaviour (Kulviwat, Bruner, & Al-Shuridah, 2009). Boontaring, Chutimaskul, Chongsuphajaisiddhi & Papasratorn (2012) had done a study on examining the factors influencing the intentions to use smartphone for e-Health service among Thai elderly. The final outcome explains that all three variable; perceived value, effort expectancy and facilitating condition have strong positive relationship with behavioural intention.

In the study done by Ting *et al*., (2011) it was found that there is a positive relationship between social needs and social influence that contributes to smartphone future purchase behaviour among university student. Zhang, Lee and Chen, (2012) did a research on customers' behavioural intention in adopting 3G value added service by examining consumers' perception towards secured handset enabler (SHE) and they discovered that useful, ease of use and hands-on experience of (SHE) application through it has significant relationship with behavioural intention. Besides, Limi, (2005) has stated that the evolution of smartphone technology enables these devices to support a wider portfolio of services to be provided to end-users, thus emphasizing the increase in saturation on both service and the subscriber markets.

Verkasalo (2007) argued that there are two layers of needs with regard to mobile services; mobile communication services (eg, entertainment and creativity vs (versus) communications and belongingness) and new technologies (such as internet packet data access and challenger radio access technologies). These services help to fulfill different kinds of needs of mobile user and at the same time this approach increases the end-users' freedom of choice. Moreover, attitude showed efficacies as the predictor of behavioural intentions and behaviors in a variety of environments including work related behaviors (Morris *et al*., 2009). Chin, Felt, Sekar & Wagner, (2012) did a research on measuring smartphone security and privacy and at the end of the research they found that smartphone users are prefer to install applications such as games and entertainment application and they are less–brand conscious and more price-conscious when installing an application on their mobile device. To add, mobile users are ignorant towards the application with terms of service and policies. This is supported by Solomon *et al*., (2006) where behaviour had became a tool that urged customers' intention to do something to an attitude.

According to Tian Shi & Yang, (2009), when consumers viewed smartphones as a necessity, they perceived to be overly dependent on their smartphones and have a strong propensity for continuous usage making the smartphone an integral part of their everyday life. According to Hassan *et al*., (2011) individual usage behaviour was influenced by belief and attitude. The use of smartphone is not merely as a computational device but also as personal expressions of the users' lifestyle (Castells, 2007). Castell, Fernández-Ardèvol, Qiu, & Sey, (2007) (p. 96) stated that voluntarily to switch off their phones in certain public spaces, such as churches or

concert halls, while they was not so concerned about the phone intruding into their interaction with friends and family. Apart from that Aarts and Dijksterhuis, (2000) suggested that the habit of a specific behavior leads to continuous performance of that behaviour. Stephen and Davis, (2009) asserted that the normal mobile phones and laptops had became widely diffused into smartphones for consumers' convenience. Hamka and Bouwman, (2012) stated that to provide a successful mobile service, it is important to design a service that adds value and matches the behavioral pattern of their consumers.

Social need is one of the determinants of consumers' dependency on smartphones. This is because smartphones leads to the maintaining of relationships between and among individuals (Lippincott, 2010). Bauer and Lukowicz, (2012) did a study and detected on stress related situation by mainstream smartphones; and it was revealed that people showed different social behaviours during stress-full and stress-less moments. Chu and Keh, (2006) stated that brand positively influenced behavioural outcomes, including purchase intent. The needs for social interaction such as checking e-mails, communicating on social networking websites, and using online chat on their smartphones positively affect consumers' dependency on smartphones (Hudson, 2010). Min, Ji and Qu, (2008) found that demographic context will shape consumers' attitude to such a service because different types of users have different mind sets and attitudes towards acceptance of mobile commerce. Social interactions started by media providing services via smartphones users' applications indicates that this new resources can be developed to improve social activities and relations among social network users (Gomes, Pimentel, & Campos 2011). Moreover, Wei & Lo, (2006) asserted that consumers were highly engaged

with smartphones when there was a positive correlation between social influences and social needs. Verkasalo (2009) have done a research on measuring user experience on mobile device and in the outcome of research he found that mobile users who access the internet to check their email show lower satisfaction level, because of the disadvantage of smartphone features such as small screen, small keypad and lack of push functions. Yoo, Yoon & Choi (2010) asserted that most consumers hesitate to buy early stage innovative product that are on sale in market. This is attributed to fear of consumers that the product could be technologically defective and it will be a waste of money if they buy such products.

Social influence is often seen as a strong influencer that has positive impact on the dependency of using smartphones technology (Klobas & Clyde, 2001). Smartphones allow consumers to satisfy their needs and be able to stay connected with others either through social networking sites or using live chat integrated through smartphones (Bridges *et al*., 2010). Crisp & Williams, (2009) found that perceived cost and social influence make university students to choose iPhone against other phones available in the market. It can be seen that smartphones is the important facilitator of consumers in fulfilling their social needs by engaging with smartphones technology (Wei & Lo, 2006). According to Hundley & Shyles, (2010), social relations positively influenced the consumers' dependency on smartphones technology. Klobas & Clyde, (2001) found that social influence is often seen as a strong influencer that has positive impact on the dependency of using smartphones.

Pitchayadejanant (2011) also noted those empirical connections between perceived value and the desire to purchase new smartphones among consumers instead of performance, expectancy and behavioural intention. Min, Ji and Qu, (2008) asserted that different types of users have different type of attitudes and behaviour towards the acceptance of mobile commerce. Sharma and Patterson, (2000) found that consumer satisfaction and probability of switching behaviour was influenced by the attractiveness of that product.

According to Watts & Wyner (2011), smartphones are poised to enable ethical consumption that contributes to achieving the benefits of a society creating a market-based mechanism for motivating companies to operate responsibly. With the advanced micro-computing technology in particular smartphone, it creates ubiquitous access for social networking cite by smartphone user without limitations increasing social networking addiction (Kang, Shin & Park, 2013).

Smartphone technology plays very vital roles across various industries and work settings. For example, in the healthcare industry, it is used in the decision-making process. In the tourism sector, smartphones have been found useful in boosting business activities (Choi, Park, & Park, 2012). Meharia (2012), Ting, Lim, Patanmacia, Low & Ker (2011) also established the worthiness of the usability of smartphones in boosting business activities and in increasing user willingness of future purchase in the financial and educational setting respectively. Smartphones are considered as light versions of computers with ubiquitous telephony functionality as the emergence of smartphone technology enable smartphone users to store a vast array of different data on their devices, ranging from contact lists, personal pictures

to messages (e-mail, SMS, MMS), birthdates, music, movies, personal passwords and other various files depending on the respective Operating Systems (OS) used (Dörflinger, Voth, Krämer & Fromm, 2010).

2.8 Technology Acceptance Model (TAM)

The TAM is used to provide an explanation of the determinants of computer acceptance that is generally capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified (Davis *et al*., 1989, p. 985). TAM is most widely used as a strong and influential model in the field of technology, information system and service to predict users' acceptance towards new technology (Dash, Mohanty, Pattnaik, Mahapatra & Sahoo, 2011). Daud, Awal, Bakar & Osman, (2011) mentioned that TAM is actually based on the social psychological model that is widely used to measure individual adoption of new technology. The TAM is a well-known theory that is used to investigate users' acceptance due explain users' behaviour and general attitude towards the use of technology (Putzer & Park 2012). TAM is also used to describe differences between attitude and behavioural acceptance towards on-going use of newly introduced device and system in market (Arning & Ziefle, 2007).

However, not every model or theory can be applied to explain consumer acceptance and their behaviour of certain innovation or product. Therefore, a different model might come into play for different categories of possible users (Jongepier, 2011). Through the past research, scholars such as Davis, (1989) Rogers, (2003) and Van der & Heijden, (2004) have explained consumers' behaviour by

using intrinsic and extrinsic motivation models, while others, such as Fishbein & Ajzen (1975) developed the Theory of Reasoned Action (TRA) to give alternative view of intrinsic and extrinsic views towards behavioural attitude.

Hsu & Lin, (2008) accounted that intrinsic motivation refers to perceived enjoyment while extrinsic motivation emphasizes the behaviour of a person to achieve specific goal or reward. The TAM is a perfect predictive tool in explaining behavioural intention and this model is accurately indicating the user's technology acceptance (Mao & Palvia, 2006). Furthermore, in further analysing the Technology Acceptance Model (TAM), perceived ease of use and perceived usefulness were influenced by some external variable (e.g. system characteristic and user differences) that effect directly usage behaviour (Arning & Ziefle, 2007).

2.9 Development of Theory

Technology Acceptance Model (TAM) was found by Davis in 1986 form Theory of Reasoned Action (TRA). Davis developed the TAM by introducing two belief factors; perceived ease of use and perceived usefulness to identify the factor that caused people to reject or accept an information technology. From the outcome of the research, he also found that perceived usefulness and perceived ease of use play important roles in individual believes towards using information technology tools.

According to Davis (1989 p. 320), perceived usefulness is defined as the degree to which a person believes that, using a particular system would enhance his or her job performance and perceived ease of use is defined as the degree to which a person believes that using a particular system would be free of effort. These two

factors are playing the role of mediator on actual system to determine an individual's intention to use a technology based system (Dash, Mohanty, Pattnaik, Mahapatra and Sahoo, 2011).

2.9.1 Theory of Reasoned Action (TRA)

Ajzen and Fishbein introduced the theory of reasoned action (TRA) in (1975) with purpose to examine behavioural intention and actual usage. The main function of (TRA) to overcome limitation of Theory of Planned Behaviour (TPB) when dealing with behaviour, TRA was developed to capture motivation factor that influenced the behaviour of that person. According to Davis (1989), TRA is used to determine the individual's salient beliefs on attitudes towards behaviour and TRA capture internal psychological behaviour of user through numerous external variables.

In the past two decades, TRA mode had became one of the most popular theory that was widely used by researcher to investigate user behavioural intention in various field. TRA was combined with six different components and it was behavioural belief, normative belief, attitude, subjective norm, behavioural intention and actual use shown in Figure 2.1. Armitage & Conner, (1999) had defined attitude as the overall negative or positive evaluations of individual behaviour. Some scholars argued that the belief of individual was constructing from outside information toward attitude, subjective norm and perceived behavioural control (Lin *et al*., 2012) .

2.9.2 Theory of Planned Behaviour (TPB)

TPB is an important factor in explaining intention and behaviour (Lin, Chan and Xu, 2012). TPB is used to predict intention and behavioural of individual toward specific product (Ajzen, 1991; Armitage & Conner, 1999; Perugini & Bagozi, 2001). Prior studies have found that attitude has stronger relationship towards intention in theory of planned behaviour (Brown & Venkatesh, 2005; Venkatesh, Moriss & Ackerman, 2000; Pavlou & Fygenson, 2006; Lin, Chan & Wei, 2006). Some scholars argued that the individual belief was the representative of external information that they received which will construct the person's attitude subjective norm and perceived behavioural control (Abraham & Sheeran, 2003 and 2004).

2.9.3 Technology Acceptance Model (TAM)

Technology Acceptance Model was developed from the Theory Reasoned Action by Fred Davis to measure and predict user acceptance towards information technology. He introduced two new variables in TAM and this variable differ TAM from TRA as it was known to include perceived ease of use and perceived usefulness. Davis (1989) affirmed that perceived ease of use and perceived usefulness were indirectly influenced by external variable towards information technology usage. The examples of external variables found in the previous research are perceived cost (Daud et. al., 2011) social pressure (Liang, Xue & Bryd, 2003).

Davis, Bagozzi & Warshaw, (1989 .p.985) stated that TAM is used to provide an explanation of the determinants of computer acceptance that is in general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified. Little, (2003) stated that almost all previous research had

used TAM model to study the acceptance and future use of participant based on workplace environments but not in public zone (Little, 2003). Meister and Compeau, (2002) found that TAM model is able to explain 30% of system usage and 40% of users' intention. In the first research done by Davis (1989), by using technology acceptance model, the outcome of the research explained that user would have intention to use the system if the system is useful and available to them. However, Davis declares that perceived ease of use was not strongly correlated in software system usage as perceived usefulness.

2.9.4 Technology Acceptance Model 2 (TAM2)

Venkatesh & Davis, (2000) further modified TAM model into TAM2 and they also introduced two new processes in TAM2 i.e. social influence process and cognitive influence process which were designed to explain perceived usefulness and users' intention. Social influence process has three variables which are subjective norm, image and voluntariness and these three interrelated variable are influence, individual behaviour and intention to accept or reject that technology. Alrawashdeh, (2011) stated that TAM2 was developed to hide the weakness of actual TAM model because the first model failed to explain social influence factor and it was only designed to determine user's attitude and intention.

2.9.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh *et al*., (2003) introduced Unified Theory of Acceptance and Use of Technology (UTAUT) and it was designed by reviewing eight user acceptance models. Moreover, Venkatesh explained that UTAUT was designed to explain the subsequent usage behaviour and user's intention to use the system. According to

Mak, Nickerson & Isaac, (2009) the UTAUT model have four variables which are performance expectancy, effort expectancy, facilitating condition and social influence that have direct relations towards behaviour and usage intention. Furthermore, this variable has four mediators that are gender age, experience and voluntariness that measures the impact of usage intention and behaviour. Reneau, (2012) stated that the ability of UTAUT model is to generalise from corporate environment to inclusive population where it was tested and developed, but not been shown.

2.9.6 Senior Technology Acceptance Model (STAM)

Renaud & van Biljon, (2008) had proposed the Senior Technology Adoption and Acceptance Model (STAM) for the understanding basic use, rejection, and fully embracing of technology among senior population. Reneau, (2012) found that STAM model is different from Technology Acceptance Model (TAM); this is because STAM model can figure out adoption and accepting the technology. Furthermore, STAM model also is capable to differentiate external social influence. Rogers, (2004) stated that one of the STAM concept is acceptance and the concept is also known as "re- invention". Roger also stated that re-invention occurs when the technology is not fully diffused in social group than it created unique self-innovative personality in user's to discover new technology.

2.10 Theory of Reasoned Action (TRA) and Technology Acceptance Model (TAM)

TAM has been empirically tested by Davis to predict and explain user acceptance and rejection of computer based technology. Davis has conducted astudy to identify, predict and explain future user behaviour using TAM model. TRA is a

social psychological model that is widely used to determine consciously intended behaviour (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975). Figure 2.1 represents the diagram of Theory reasoned action (TRA) by Ajzen (1975) with its components.

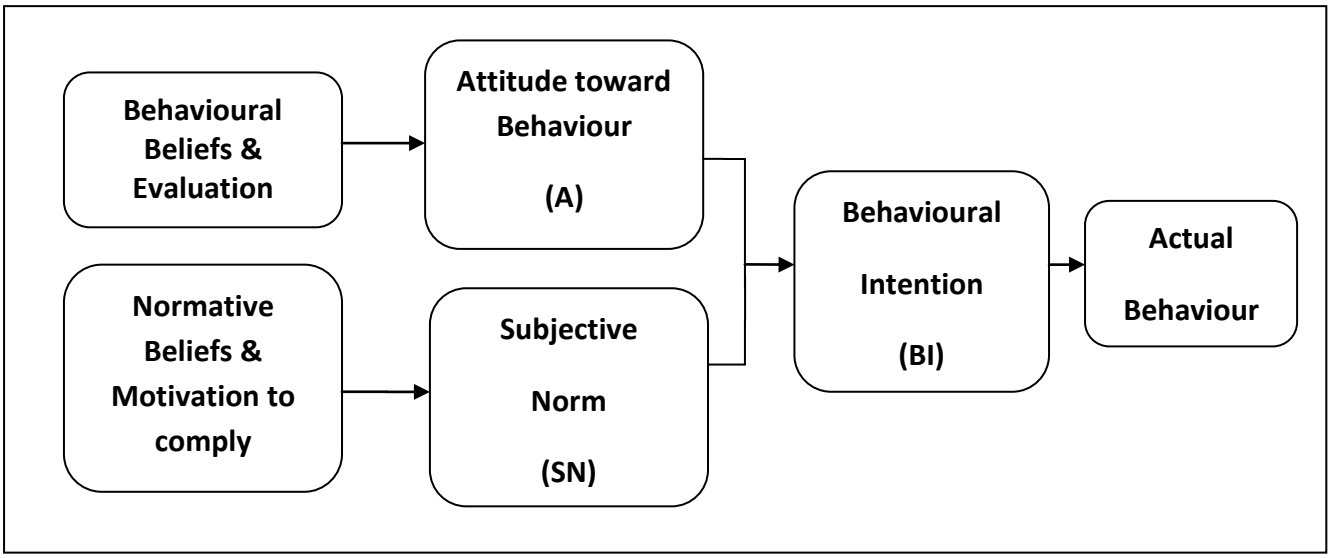

Figure 2.1
Theory Reasoned Action (TRA)
Source: Fishbein and Ajzen (1975) p.16

According to Arning and Zielfe, (2007) Theory Of Reasoned Action (TRA) describes the individual behaviour intention towards certain behaviour and technology acceptance model and behavioural intention describe the users' decision towards new technical device or software package usage. Fishbein and Ajzen, (1975 p. 320) pointed that subjective norm in TRA refers to the person's perception that for most people who are important to him, he should or should not perform the

behaviour in question.

In addition, Putzer and Park, (2012) noticed that TAM has been applied in various studies based on the adoption of Information Technology (IT) and they found that a TAM model has strong empirical findings towards consumers' behavioural intention. Chan and Teo, (2007) postulated that solid interaction between perceived usefulness and perceived ease of use in TAM play important roles to the contribution of better understanding of studies. The main objective of Theory of Reasoned Action is to determine individual attitude and impact of subjective norm (Liang and Yuan, 2012). Attitude towards behaviour in TRA refers to individual's positive or negative evaluation of behaviour. Subjective norm refers to the habits of the person that can be judged by his or her behaviour.

2.11 Components of TAM

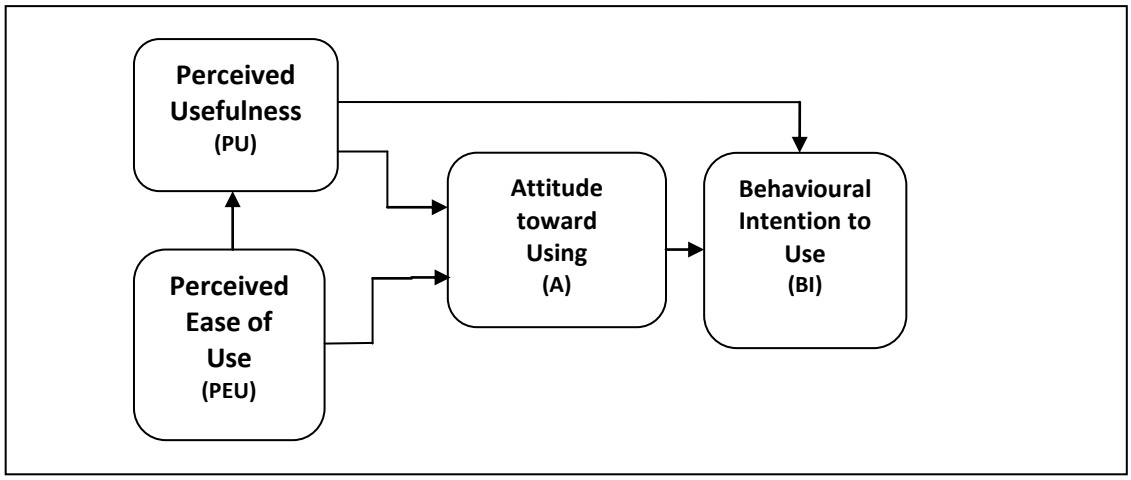

Figure 2.2
Technology Acceptance Model
Source: (TAM) Davis 1986 p.985

TAM is formulated to identify the impact of external factor towards attitude, intention and internal belief (Davis, 1989). Almost all previous researches have discussed in their literature review about Technology Acceptance Model that was adopted from (Davis, Bagozzi, and Warshaw, 1989; Davis, 1989; Davis, Venkatesh, Morris, Davis, and Davis, 2003; Rogers, 2003; Van der & Heijden, 2004).

Technology Acceptance Model is the model which consist perceived ease of use, perceived usefulness, attitude toward usage and behavioural intention that brings out the final outcome of actual usage towards that particular technology as shown in Figure 2.2 above.

Some scholars noticed that the perceived usefulness and perceived ease of use in TAM was the main key factor that was used to examine individual intention to use toward particular technology (Davis, Bagozzi & Warshaw, 1989; Davis,1986; Davis,1993). Straub, Karahanna & Chervany, (1999) stated that perceived usefulness was used to find advantages of the system and perceived ease of use are used to measure complexity of the that technology. These two constructs play major roles in the attribute of users' attitude toward that technology.

TAM model is one of the most effective models which represented significant theoretical contribution to predict which factor affects efficiently on usage towards any system. The two significant variables were perceived ease of use and perceived usefulness seems more applicable to measure any future adoption or acceptance of user in order to reach explanatory concept. Also, several number of studies had shown that perceived usefulness and perceives ease of use has a different dimension that focus on measure effect of habitual usage and system usage. (Cakmak, & Basoglu, 2012; Chen, Yangil Park, Gavil & Putzer, 2010; Park & Del Pobil, 2013)

Arning & ziefle (2007) found that perceived ease of use was strongly influenced by perceived usefulness towards the usage on particular system. According to Arning & ziefle (2007), behavioural intention is used to determine users' decision to use new system or device. Dash *et al*., (2011) stated that basically, TAM is used to predict positive perspective of users towards adopting new technology. Mak, Nickerson & Isaac, (2009) postulated that perceived ease of use and perceived usefulness are the main external variables that affect individual attitudes towards new technology.

Davis, (1989) stated that the purpose of TAM is to identify individual attitude towards new technology and their actual usage that was affected by his or her own behavioural intention to use it. Davis, et. al., (1989) asserted that TAM model is only limited to examine theorganizational use of technology. It was supported by Reneau, (2012) that the external forces such as feelings of other co-workers, employer and supervisor demands and personal performance in the workplace would effect on the entire TAM model. Mathieson, Peacock & Chin, (2001) asserted that users would have intention to use that technology if that technology was influenced by the impact of perceived ease of use and perceived usefulness towards users' attitudes.

TAM is designed to capture impacts of attitude, internal belief and intention which emerged from external factors (Little, 2003). TAM diagram is used to examine users' intention towards particular technology that is divided in four stages. First stage started with perceived usefulness (PU). Then, perceived ease of use (PEU) was used to examine impact from external variables towards using the particular technology. Little, (2003) postulated that the two beliefs in TAM model which are perceived ease of use and perceived usefulness function to determine the attitude

towards use. The second and third stage is attitude toward using that will determine the behavioural intention towards the technology. In TAM model, technology acceptance and adoptions determine the behavioural intention. Behaviour intention was used to predict actual usage of that system and technology adoption behaviour at an individual level (Davis *et al*., 1989). TAM theory are basically used to approach and to identify on individual behavioural and his or her perception towards that system.

Venkatesh & Davis (2000) found that individual behavioural intention towards the use of the system is determined by his or her perceived usefulness and perceived ease of use of that system. The final stage determines the overall outcome of the process of the users' final decision making process whether he or she wants to use or reject that technology. TAM was applied by many researchers in their studies to predict user's intention and acceptance towards particular device or system. In the context of usage of smartphone technology, Chen, Park & Putzer (2010) used TAM to conduct a study regarding the acceptance of smartphone technology among health care professional. In the outcome of study, they found that attitude of healthcare professional towards smartphone trends positively influenced health care professional to use that device.

Table 2.1
Selected Literatures Technology Acceptance Model related Studies in Malaysia.

No	Author / Year	Findings	Method
1	Alnajjar, Mahmuddin & Thurasammy (2012)	PU, BI, PEU and Attitude positively influence m-commerce acceptance.	Survey
2	Bojei & Hoo (2012)	Attitude and PEU influence repurchase intention of smartphone in Malaysia.	Survey
3	Duane, Reilly & Andrew (2012)	Trust is main factor that influence consumer to use M-payments while PU and PEU influence payment diction.	Survey
4	Johari & Ismail (2012)	PEU support mobile devices for lifelong leanings.	Survey
5	Teo et. al (2012)	PEU,PU and Perceived compatibility (PC) significantly influence M-commerce acceptance.	Survey
6	Cheah et. al (2011)	PU, PEOU, relative advantages and personal Innovativeness positively related with the intention to adopt mobile banking services.	Survey
7	Daud et. al (2011)	PU, Perceived trust and Perceived cost significant with Intention to use M-commerce.	Survey
8	Suki (2011)	PU was influence intention to use 3G mobile services and Perceived enjoyment influence BI toward using 3G mobile service.	Survey

Table 2.2

Selected Literatures Technology Acceptance Model related Studies in Europe.

No	Author / Year	Findings	Method
1	Kang & Maity (2012)	PEU, PU and Perceived Monetary Value positively significant and social influence was not significant.	Survey
2	Meharia (2012)	Perceived privacy and Confidentiality was influenced by attitude toward usage of Mobile payment system (MPS).	Survey
3	Chen, Park, Gavin & Putzer (2010)	Attitude is positively influence intention to use mobile device among healthcare professional PEU and PU have significant relation toward behavioural intention and actual use.	Survey
4	Mak, Nickerson & Isaac (2009)	Attitude toward using mobile phone in public place was depending on country and age factor.	Survey
5	Kim, (2008)	PEU and PU have positive impact in usage of Mobile wireless technology (MWT). BI has positive impact on actual use of (MWT).	Survey
6	Park & Chen (2007)	BI was largely influenced by PU and Attitude toward using smartphone. PU and PEU positively determine attitude toward using smartphone.	Survey
7	Arning & Ziefle (2006)	Confidence and PEU was influenced by age and gender toward PDA usage.	Survey

2.12 Conclusion

The review of literature does indicate that perceived ease of use and perceived usefulness has a relationship and in fact, there are some levels of influence on attitude towards using smartphones. The examination of the literatures will aid the development and conceptualization of the research framework which will be discussed in the next chapter. This will also include the operationalization of the variables and the other components which constitute the research methodology.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The previous chapter has discussed the various antecedents of people's acceptance towards smartphone technology. This chapter describes the methodology for this study. This includes the research framework, hypothesis development, research design, and operational definition of the study variables, data collection, sampling and techniques of analysis.

3.1 Research Framework

Based on the literatures reviewed in the previous chapter, the model here under was stated. It graphically shows the interconnection between the independent variables and the dependent variable.

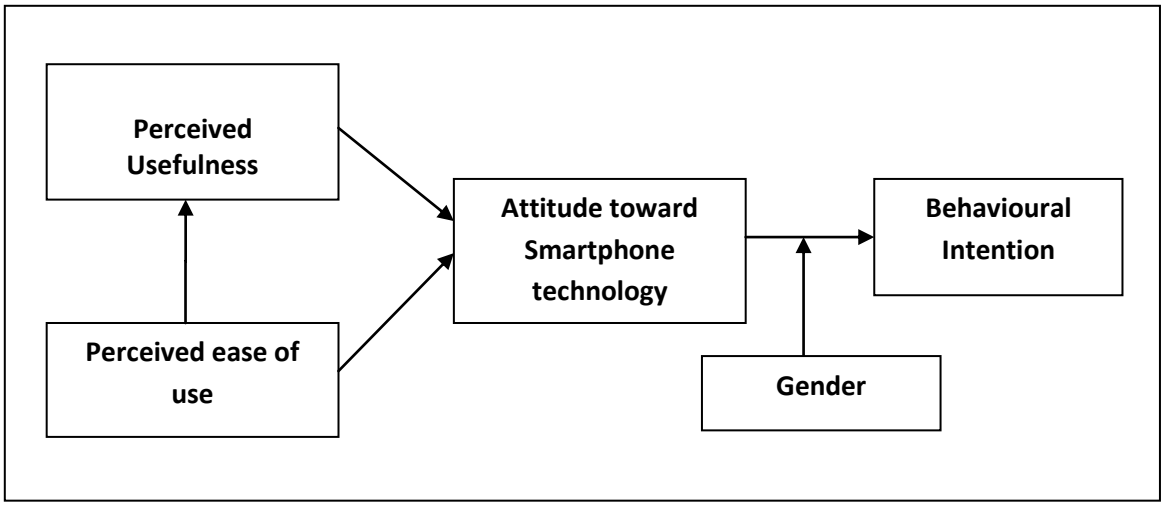

Figure 3.1
Research Frame Work

This study is constructed based on the Technology Acceptance Model (TAM) which is widely used to examine intention of users toward specific systems. This frame work was developed from literature review and research problem. There are five variables contained in this research with two independent variables (IV), two dependent variables (DV) and one moderator. In this study the independent variables cover the problem identification process of this research represented by perceived ease of use and perceived usefulness. Meanwhile, the dependent variables represent the attitude towards using smartphone technology that indicates the solution designed for final outcome while behavioural intention was used to identify individual intention and acceptance of smartphone technology. Gender is the moderator between attitude and behavioural intention toward acceptance of smartphone technology.

3.2 Conceptual Definition of Variables

3.2.1 Attitude:

Eagly & Chaiken, (1993) defines attitude as a psychological tendency that is expressed by evaluating a particular entity with some degree of favour and disfavour. Also, Fishbein & Ajzen (1975) defined attitude towards a behavior, as an individual's positive or negative feelings (evaluative affect) about performing the target behaviour. Therefore for this research, attitude is defined as an individual positive or negative feeling towards smartphone technology.

3.2.2 Behavioural Intention

Behavioural intention is defined as individual intention towards an actual use and information system. Venkatesh *et al*., (2003) proclaimed that behavioural intention is defined as a favourable or unfavourable attitude of a person towards the system. Based on the definition above, therefore in this research behavioural intention is defined as the favourable or unfavourable attitude of a person towards smartphone technology.

3.2.3 Perceived Usefulness:

Perceived usefulness is defined as the degree to which a person believes that using a particular technology will enhance his or her job performance (Davis *et al*., 1989). Therefore these studies defined perceived usefulness as the degree to which a person believe that accepting smartphone technology will enhance his or her job performance.

3.2.4 Perceived Ease of Use:

Perceived Ease of Use (PEU) refers to the degree to which a person believes that using a particular technology will be free of effort (Davis *et al*., 1989) or in another way around, it is a belief that little or no effort is required in the use of a certain technology. Thus, this research defines perceived ease of use as the degree to which a person believe that using smartphone technology will be free of effort.

3.2.5 Gender

Gender refers to responsibilities and socially constructed roles of women and men, and it includes expectations held about characteristics, and likely behaviours of both men and women (Goldberg, Russell & Cook, 2003). Gender has been defined as culturally determined cognition attitude and belief system about female and male (Cohen, 1994) (p.130). For this study gender is defined as men and women's expectation and likely behaviour towards smartphone technology.

3.3 Research Design

The design that was adopted for this study is a correlational investigation. It is an individual-level based study that intends to explore smartphones technology among (UUM) students in Malaysian context. The methodology to be used for this study is quantitative, as a well-structured questionnaire was used to collect data from the respondents (final year and postgraduate students from the all colleges of the Universiti Utara Malaysia).

This approach is being used because of the economical nature of the design and a rapid turnaround in data collection (Creswell, 2003). It is also argued that a quantitative research approach can reliably determine if one idea or concept has more effect than available alternatives (Anderson, Sweeney, Williams & Martin 2008). Leedy & Ormrod (2005) also appointed their opinion that quantitative research is used to answer questions about the relationship between measurable variables, with the purpose of explaining, forecasting, and controlling phenomena.

3.4 Operational Definition of Variables

This study is based on two main topics, which are smartphone technology and Technology acceptance model (TAM). These concepts have specific definitions that need to be understood to develop a proper comprehension of this study. Also, the measures were adapted and minor wording and modifications were done to conform to the context of this study. Also, the instrument was administered in English Language with a Malaysian translation underneath each question. It was expected that it would be easier for the respondents to understand if the questionnaires were posed in Malay language and this can motivate them to respond to the survey. The empirical studies from which the instrument to be used for this study were adapted from, Lin & Lou (2000), Yoo & Donthu (2001), Aladwani & Palvia (2002) and Davis (1989).

The acceptance of smartphone technology was rated by using a five-point Likert scale with uniform descriptive anchors ranging from 1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4= agree, and 5 = strongly agree. This rating method is widely used for behavioural and attitudinal based survey because of simplicity in its administration (Zikmund, 2003). The same scaling was also used for the dependent and independent variables. The purpose of a rating scale is to enable respondents to express the direction and strength of opinion on the statements in the questionnaire (Garland, Huey & Bennet, 1991). Also, many researchers have concluded that the optimal number of scale categories is based on the content for which their study is being carried out, and a function of the conditions for which the measurement is being done (Komorita, 1963; Cox, 1980). For example, Chen, Park, Gavin & Putzer (2010) used five-point rating scale on exploratory analysis of the acceptance of smartphone technology. Boontarig, Chutimaskul, Chongsuphajaisiddhi, & Papasratorn (2012) used seven-point scale in determining factors influencing intention to use smartphone technology in e-health services.

The research variables consist of two independent variables: perceived ease of use and perceived usefulness. The mediating effect of perceived ease of use and perceived usefulness was also examined. The gender becomes the moderator for this study. The dependent variable here is attitude towards smartphone technology and behavioural intention. The operational definitions of the variables are also adapted from the work of Lin & Lu (2000), Chen et. al., (2002), Limayem, Khalifa & Firini (2000), Yoo and Donthu (2001), Aladwani & Palvia (2002) and Davis (1989) with minor rewording and rephrasing done to the scales to suit the context in which this investigation was carried out.

3.4.1 Attitude

Bagozzi & Dholakia, (2002) defined attitude as psychological tendency expressed by evaluating a particular entity with some degree of favour or disfavour manner with respect to some goods. Mathieson *et al*., (2001) also defined attitude as consumers' psychological tendency to behave in a consistently favourable or unfavourable manner with respect to counterfeit goods. Using a five-point Likert scale, the respondents was asked to indicate the extent to which they like using smartphone technology.

The items in measuring this variable are adapted from Limayem *et al*., (2000), Chen, Gillenson & Sherrel (2002) and Lin & Lu (2000). Minor modifications was did; translations also did to give respondents the option of choosing to respond in English language or in Malay. There are 4 items used to measure attitude. The following items was used in measuring attitude; "I like using smartphone technology", "I feel good about using smartphone technology", I think positively towards using smartphone technology", "The smartphone technology make it easy for me to maintain relationships with friends and family".

3.4.2 Behavioural Intention

Engel & Blackwell (1982) defined behavioural intention as a future behaviour of individuals, which subjectively relates to actual behaviour. There are seven items used to measure behavioural intention. The source used to develop this measuring variable was adapted from Masrom (2007). The items were measured by using five-point likert scale to measure respondents' opinion towards smartphone technology. The following statements were used to measure behavioural intention; "I intended to use smartphone technology, "I predict that I would use smartphone technology, "I plan to use smartphone technology, and "I intend to be a heavy user of smartphone technology.

3.4.3 Perceived Ease of Use:

Perceived ease of use refers to degree to which "user perceives the system could be used free of effort" (Davis, 1989). Venkatesh, (2000) also refers consumers' perceptions of the ease in which their mobile phones can be used to access or download mobile content and access information about current social or entertainment activities. There are nine items were used to measure perceived ease of use.

The respondents were asked to indicate the extent to which they need less effort to use a smartphone technology. The item for this section of the instrument was measured using a five-point Likert scale with uniform descriptive anchors. After minor modifications, the items that was used to measure perceived ease of use are, "I find smartphone technology is complicated to use", "Learning to operate the smartphone technology is easy for me", "Interacting with the smartphone technology is often frustrating", "I find it easy to get the smartphone technology to do what I want to do", "It is easy for me remember how to perform a task using a smartphone tchnology".

3.4.4 Perceived Usefulness:

According to Davis (1989) perceived usefulness means that users believe that the technology will improve their performance and make them learn efficiently. Also, Davis, Bagozzi & Warshaw (1989) noted that perceived usefulness is the level at which an individual believes that using a particular system would enhance a person's job performance. The five-point Likert scale was used to measure items for this variable and minor modifications are done. There are ten items listed to measure perceived usefulness. Respondents were asked to indicate the extent to which smartphone technology aid their ability in carrying out various tasks. The items are "Using smartphone technology improves the quality of the work I do", "Using smartphone technology gives me greater control over my work", "Smartphone technology enables me to accomplish tasks more quickly" and "Smartphone technology supports critical aspects of my job".

3.5 Measurement of Variables / Instrumentation

Generally most scholars have used questionnaires as their main research instrument for evidence to their research question. According to Sekaran (2003), in conducting quantitative study, survey method is a lowest comparative cost if compared to other quantitative data collection method. A set of questionnaire was used to collect data from the respondents (final year and post graduate students) from the colleges in Universiti Utara Malaysia (UUM). Coding is done for easy identification before the data is entered into the Statistical Package For Social Sciences (SPSS) for further analysis. The instrument was made up of five sections. Section one is cover the socio-demographic variables, section two is on items on perceived usefulness of smartphone technology, section three was made up of perceived ease of use of smartphone technology, while

section four was constitutes items on attitudes towards using smartphone technology and finally section five was cover behavioural intention of smartphone technology.

The questionnaire was designed to measure attitude and behaviour differences between genders toward smartphone technology. This is because these items are related to the ones in this questionnaire that has been used in capturing data from diverse categories (e.g. gender differences (Singh & Goyal, 2009); Attitude (Pitafi & Farooq, 2012; Putzer & Park, 2012; Dash et. al., 2011; Mac, Nickerson and Isaac, 2009); smartphone adoption (Yoo, Yoon & Choi, 2010; Kang, Choo, & Lee 2011) smartphone acceptance (Park & Chen 2007; Chen Park, & Putzer, 2010);behavioural intention (Morris *et al*., 2009; Brandenburg & Katharina, 2012). This method was applied in this study because it is economical and suitable for short time of study. The questionnaire was originally adopted from two sources. The first one was adopted from Davis, 1989, while others were adapted from Limayem *et al*., (2000), Chen *et al*., (2002), Lin & Lu (2000) and Masrom (2012).

3.6 Data Collection

Data was collected from the primary source as identified above. Specifically, students from final year and post graduate across the colleges in the Universiti Utara Malaysia (UUM) were the respondents. The questionnaires was be delivered by hand and collected likewise. This is eventually increase the response rate. However, a preliminary notification was state on first page of questionnaire that stating the purpose of the study and promise of the confidentiality of respondents' personal details.

3.7 Population:

Population refers to a group of people in of organization that are chose by the researcher (Sekaran & Bougie, 2010). The population for this study is final year and post graduate students across the colleges in Universiti Utara Malaysia (UUM). According to Sekaran (2003), population of a study should contain entire group of people, events, or things of interest to be used by researcher in the investigation. The total population of UUM final year and postgraduate students was stated below is based on the data made available by the Academic Affairs Department (AAD) or *Hal Ehwal Akedemik (HEA)* of UUM, there are total of 11, 154 students till end of September 2012. This number includes 5,601 final year students and 5,553 postgraduate students.

The reason for choosing the final year and post graduate students of the UUM is based on the fact that almost all the students has experience with the use of smartphone technology. Moreover, they can influence smartphone purchasing to a large extent. Furthermore UUM final year and postgraduate students come from diverse personal backgrounds and can be referred to as idiosyncratic. In the university setting, students use smartphones to access social network sites such as games, Twitter and Facebook. However, it was doubt which, do they maximally use other applications that available in smartphones such as m-commerce, e-mails, reading news and blogging.

Therefore by selecting UUM final year and postgraduate students as respondent we can figure out what intention was drive them to accept smartphone technology to fill their need. Furthermore UUM final year and postgraduate students will soon be going to real job market after finishing their degree and they have the power to purchase a smartphone when they work while current fresh degree students were depending on their study loan of Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) to buy smartphones.

3.8 Sample Size

A sampling method was conducted in the study because if we refer to the entire population, it may not be realistic and there is some advantage by conducting sampling; greater accuracy in result, greater speed of data collection and availability of population elements (Lawan, 2012). Sampling was conducted rather than collecting data from every element from the population (Zikmund, 2003). This is because selecting a sample is likely to produce more reliable results (Sekaran, 2003). Peats (2001) stated that, if the sample size is small it makes the study less generalizable to the population of interest and more vulnerable to errors. Based on the population and in recourse to the sample size determination data by Krijcie and Morgan (1970), the sample size for this study was a minimum number between 357 to 400 persons. Also, Roscoe (1975) added that a sample size bigger than 30 and less than 500 is appropriate for most research. Thus, the researcher used the simple random sampling technique to determine the respondents.

3.9 Sampling Procedure

There are numerous sampling techniques such as random, cluster, systematic, selective and snowball sampling were representing the population (McMillan & Schumacher, 2008). Sekaran and Bougie (2010) defined sampling as the process of selecting number of the right elements from the population, so that a study of the sample and an understanding of its properties or characteristics make it possible for us to generalize such properties or characteristics to the population elements.

According to Cavana, Delahaye, & Sekaran (2000), sampling refers to the process of choosing population to match with elements that help researcher to understand the characteristic of sample. In light of the above, the researcher was use the simple random sampling technique to determine the respondents.

3.10 Data Collection Procedure

The questionnaire was designed to collect data which was support the researcher in investigating the relationship between the dependent variable (attitude and behavioural intention) and independent variable (perceived ease of use, perceived usefulness and gender).

Base on Krejcie and Morgan's (1970) sample size selection diagram, the sample size was chose for this study is 500 students from the total population of 11, 154 students. Microsoft Excel 2010 was used to randomly select the sample. There are three columns in Microsoft Excel; the first column shows the numbers, second column represents the name of the students and at the third column represents the outcome of randomly picked number by Microsoft Excel. First all 500 students was numbered or listed accordingly. Then by using command "RANDBETWEEN" in Microsoft Excel 2010 the all the students was highlighted, i.e. in command column the "RANDBETWEEN (1,500)" was typed, the 1 represent the result of random selection numbers start from first box number as mentioned above and 500 represents the list of total sample were choose from total population and therefore the result of all number that were randomly picked by Microsoft Excel 2010 were all listed in column three, the first number that was picked by Microsoft Excel was 15. Therefore base on the result of Microsoft Excel the first student who is going to receive the questionnaire is student number 15. Then the list of random numbers of sample produced by Microsoft Excel 2010 was used to select the sample and to distribute the questionnaires.

3.11 Technique of Data Analysis

There are several statistical techniques that can be conducted to draw accurate conclusion about smartphone technology acceptance. However for this empirical study the data was analysed by using SPSS software which help to analyze factor and reliability and to test the goodness of fit of the measures, descriptive statistics, frequency and percentage of returned questionnaire (Coake, 2005). These techniques were easy to describe characteristic of respondents such as age, gender, academic qualification, education background and personnel income, job title. The survey data received from respondents entered in Statistical Package for Social Science (SPSS) software version 19.0 that was used to examine the details about the respondent in a comprehensive manner. Basically, SPSS tool was used by scholars to conduct data analysis and hypothesis test that enable us to describe descriptive statistic, relationship between variables, correlation analysis, characteristic of respondent and relationship between variables and finally measure the significant of linear between variables (Coakes, 2005). To identify the objective of this study, regression analysis was used to measure the strength of relationship between variables.

The primary objective of this research is to test the hypothesis of smartphone technology acceptance based on conceptual frame work of this study. For the purpose of validity and reliability of the research model, the researcher was check the cronbach alpha coefficient of maximum and minimum value between independent and dependent variable to be taken in as consideration. Reliability refers to test consistency where cronbach alpha test is used to determine which item is consistent and not consistent if the data is inconsistent it is removed.

Cronbach's alpha is an index of reliability for quantitative data that adopt in this study as prior instrument to measure coefficient of measurement instrument and Cronbach's alpha was used to point out how well the items in a set are positively correlated to one another (Coakes, Steed & Ong, 2010). According to Nunally (1978), an internal reliability (Cronbach's alpha α) value of 0.70 or above is considered to be the criterion for demonstrating strong internal consistency of established scales. However, in an exploratory research, Hair *et al*., (1998) claimed that a Cronbach alpha value of 0.50 or above is also considered as significant. According to Cavana *et al*., (2001) and Sekaran, (2009) the measurement of cronbach alpha must be above of lower limit of acceptability (α >.50) therefore all measurement was be accepted as highly reliable. Based on these positions, an internal reliability that is from 0.60 and above is accepted for this study.

3.12 Stage of Data Analysis

There are four stages of data analysis were conducted in this this study to analyse the data. At the first stage, descriptive analysis was conducted to identify the structure of the relationship between all measurement items. The descriptive analysis used to analyse the missing data and to describe the variances in respondents' characteristics. At the second stage, exploratory factor analysis (EFA) was conducted to purify and validate measurement scales. The objective of conducting (EFA) as stated by Hair et al. (2006) is to prepare the data for any bivariate or multivariate analysis. Finally at the third stage, the process involves assessing and analysing the entire research hypothesis model. The hypothesis was developed based on three step that suggested by Baron and Kenny (1986). The hierarchal regression multiple regression analysis was conducted to understand the mediating effect that help to answer the research question.

3.13 Factor Analysis

Factor analysis is normally used to identify the validity factor or dimension of each variable in order to reduce large number of observed variables to small sets of underlying factors. Emory and Cooper, (1991) defined factor analysis technique as "*to reduce a large number of variables to a smaller number by telling us which belong together and which seem to say the same thing*" (p.62). Factor analysis normally can be conduct on rotated or un-rotated basis and if factor analysis is carried out in rotated basis, it is have various technique and one of the technique is varimax, a technique that tend to be give a clear separation of factors (Hair *et al*,. 1995). Cooper & Schindler (2001) stated that statistical tools such as SPSS was used as factor analysis that helps in identifying the right measuring instruments to the variability of research results. The measurement model uses Exploratory Factor Analysis (EFA) to purify and validate measurement scales.

On the other hand, to determine the appropriateness of factor analysis, the Barlett Test of Sphericity this inspects the presence of adequate number of significant correlations among the variables. It provides the statistical probability that the correlation matrix has substantial correlations among at least some of the variables (Hair *et al*., 2010). At the same time Hair also stated that during measuring sampling adequacy in order to quantify the correlation among variables and appropriate factor analysis, the measurement level below 0.50 was unacceptable.

According to Hair *et al*., (2006) and Cavana (2001), exploratory factor analysis was used by scholars in exploring the data set to be used in research from existing theoretical point of view by enabling the statistical data to load on factors that are independent of theory and any prior supposition that relates to the measurement instruments to be used in

the research. Furthermore, exploratory factor analysis (EFA) is the data reduction and purification strategy to reduce large number of data that of too much needed information. According to Suhr (2006) (EFA) helps to define underlying constructs for a set of measured variables especially if the factor structure is not confirmed.

According to Hair *et al*., (2010), there are three stages of factor analysis. The first stage is to determine the number of extracted factors through the original non-rotated factor matrix. The second stage is rotate the factors if it is needed to reduce the number of items. The third stage, is to inspect the variables and to decide whether it will erase any of them due to the low load index or cross-loadings. In this study, SPSS 19.0 was used for the analysis of the factor. In addition, principle component analysis and factor varimax rotation was used to achieve the results from an exploratory factor analysis of the four independent factors.

Factor analysis can be used to:

(i) Reduce a large number of variables to a smaller number of factors for modelling purposes.

(ii) Select a subset of variables from a larger set, based on which original variables have the highest correlations with the principal component factors.

(iii) Create a set of factors to be treated as uncorrelated variables as one approach to handling multicollinearity in such procedures as multiple regressions.

(iv) Validate a scale or index by demonstrating that its constituent items load on the same factor; and (v) to drop scale items which cross-load on more than one factor among others (Garson, 2007).

3.14 Sampling Adequacy

The Kaiser Meyer-Olkin (KMO) test was conduct to measure sampling adequacy. According to George & Mallery (2007) KMO value should be greater than 0.60 while a value of 0.90 or higher is considered excellent. On other hand, Kinnear & Grey (1994) states that the value of (KMO) must be greater than 0.05 so that it can proceed to factor analysis. However, Hair *et al*., (2006) provided a guideline for the interpretation of (KMO) values with the following indicators: value in the (KMO) 0.90s is wonderful; 0.80s are worthy; 0.70s middling; 0.60s is moderate, is acceptable but 0.50s miserable; and lower than 0.50 is unacceptable.

Furthermore, Kaiser (1974) provided a rule of thumb for evaluating KMO where any value that falls between 0.5 and 0.7 could be referred to as moderate. Value that are between 0.7and 0.8 is good; values between 0.8 and 0.9 are categorized as excellent. According to Hair *et al*., (2006), the rule of thumb for variance justification is more than 60% of the total variance. Hair *et al*., (2006) also clarified that 0.30 may be a minimum requirement in factor loading and can be described as absolute value and significant, but if the load is 0.50 or greater than that, it is described as very significant. Nunnallys (1979) stated that the value of 0.50 is considered the most appropriate value in exploratory factor analysis.

3.15 Measurement of Reliability

The reason in using reliability test in this research is to see if the questionnaire is reliable or not. Carmine & Zeller (1979) defined reliability as the degree to which measurements are free from error and at same time to produce consistent results while validity was defined as the degree in which construct measure is unbiased and consistent measurement across time and across various items in the instrument. According to Sekaran (2009), if reliability is less than 0.50 it is considered to be poor and 0.60 range is acceptable, and those over 0.80 is good.

However, Wortzel (1979) stated that when the value of Cronbach Alpha shown in range from 0.50 to 0.98, the questionnaire is considered highly reliable at the same time if the Cronbach Alpha is lower than 0.35, this situation will deduce that the questionnaire must be rejected. Therefore, based on the given explanation in this research, 0.50 and above was chosen as the cut point of the reliability test.

3.16 Descriptive Analysis

Specifically descriptive statistics which includes standard deviation, range, skewness and kurtosis process were used to prepare data, data cleaning, assessing normality, checking outliers and data transformation as suggested by Coakes (2005). As soon as the data collection process is complete, initial tests was conducted to determine the response rate, inter-rater agreement, validity and reliability of the study construct.

The response rate was computed by calculating the frequency and percentage, later it was compared to the sample size estimated before data collection. The main characteristics of the sample was determined using descriptive statistics namely mean,

median, standard deviation, frequencies, and percentages. The statistical package for Social Sciences (SPSS) version 19 was used for the data analysis processes described.

3.17 Correlation Analysis

Correlation analysis was used to explain the strength and direction of the relationship between variables. There are four variables in this study i.e. perceived ease of use and perceived usefulness (independent variable), attitude and behavioural intention (dependent variable) and gender as moderator. The nature of this study is correlational as it attempts to examine the relationship between dependent variables (attitude and behavioural intention) and independent variables (perceived ease of use and perceived usefulness). The researcher merely determined to identify whether some relationship does exist among the variable in this investigation. The findings of this research should provide useful information in solving smartphone technology acceptance among (UUM) students. According to Cavana *et al*., (2000) and Field (2009), normally, correlation analysis was used in relationship based study i.e. to examine the nature direction and significance of bivariate relationship of variable used in this research.

3.18 Multicolinearity Test

Multicollinearity test was conducted in this study to identify is there are any multiple correlations between variable that is near or closed to 1, when two or more variables are correlated with each other it means that they contain redundant information that may not required thus the redundant information could increase or inflate the size of error that may undermined the analysis (Tabachnick & Fidell 2007; Coakes *et al*., (2010). Futhermore, Hair *et al*., (2010) highly recommended that before conducting the hypothesis

testing, multicollinearity testing must be conducted among independent variables and multicollinearity is detected when correlation value between variable exceeds 0.90.

3.19 Regression Indicator

In the regression process, R indicates the bivariate correlation between the detected values of the dependent variable and expected values based on the regression equation, while, the (r) in lower case, is indicating partial regression coefficient in the coefficient table that gives the regression equation of the model. R^2 (R square) in table of regression model summary is representing the coefficient of multiple determinations. Adjusted R^2 indicates the goodness of fit of the research model and the number of independent variables involved.

Beta in coefficient table is the standardized regression coefficient that agrees for direct comparisons between coefficients. On the other hand, the coefficient table provide the ***t*** value and Sig ***t*** value which point out how the partial coefficient (slopes) differs significantly from zero. The partial F values are representing the partial F-test which is a statistical test for the additional contribution to predict accuracy of a variable. The simple regression scheme (bivariate) is used with a single independent variable entered whereas in the regression equation this variable is responsible for explaining the variance in the predicted value.

3.20 Summary

This chapter has explained the methodological approach to be taken in conducting this investigation. It explains the research framework, the conceptual definitions, the hypothesis development, research design, operational definition and instrumentation, data collection and sampling procedure and technique of data analysis.

CHAPTER FOUR

FINDING AND DISCUSSION

4.0 Introduction

This chapter presents detailed results of data analysis which was carried out by utilizing SPSS 19.0. It begins with response rate, non-response bias, descriptive analysis, reliability analysis, mean score, correlation analysis and hypotheses testing on the research variables. Additionally, this chapter provides detailed results of the research model and how it fits with the data. Finally, the chapter discusses the results of the hypotheses testing using hierarchical multiple regression analysis.

4.1 Actual Respond Rates

As mentioned in chapter three, the population for this study is UUM postgraduate and under graduate students. The data collection was conducted on May 2013 lasting till June 2013. The data was gathered by distributing questionnaires by hand to each student by the researcher. Altogether, 500 questionnaires were distributed to the undergraduate and postgraduate students from all colleges. The length of the questionnaire was ten pages long and the respondent had given full co-operation to provide their point of view towards smartphone technology based on their knowledge and experience. Out of 500 questionnaires distributed, only 427 is usable and remain for further analysis, which represented as 85.4%. It seems that the response rate for this study had achieved good level because over 85.4% of the response rate was recorded. Shadle *et al*., (2013) did a research on mobile learning and during data collection process, 1500 questionnaires were distributed. However, the response rate only achieved 42% of overall response rate.

Table 4.1
Response Rate

	Number	**%**
Total Response	500	
Usable responses	427	427/500=85.4%
Total non-usable responses	73	14.6
• Incomplete respond	45	9
• Invalid data	22	4.4
• Refuse to participate	6	1.2
Total	500	100%

Table 4.1 shows the summary of distributed questionnaires. There were total 500 questionnaires distributed by researcher to collect data. After the data have been keyed in, the researcher found that there are 73 incomplete questionnaires answered by the respondent. This situation occurs when respondents have lack of knowledge about smartphone technology which leads them to fail to answer one or more question due to length of the questionnaire which was too long. Apart from that, there were 6 students who refused to participate because they have no interest to participate.

After filtering process was done, there are only 427 questionnaires considered as valid for data analysis procedure. There were 73 questionnaires being excluded due to incomplete information, invalid data, incorrect or incomplete respond. Therefore, the

remaining number of cases 427 (500-73) were used for further inspection, which accounted for 85.4% respond rate from 500 questionnaires distributed. According to Lin and Sneed (2003), the response rate above 60% is considered acceptable. Thus, the author declares that the response rate achieved for this research was acceptable.

4.2 Respondent Profile

Table 4.2 *Summary of Gender*

Items (Variable)		**Frequency** Total= 427	**Percentage** (%)
Gender	Male	140	32.8
	Female	287	67.2
	Total	427	100

Table 4.2 shows the result of gender from data collection and it is shown that female participant is higher than male. It can be seen from female responses rate of 287 students or (67.2%) of the overall respondents and male participants recorded only (32.8%) or 140. For further detail see (Appendix B).

Table 4.3
Summary of Age

Items (Variable)		**Frequency** Total= 427	**Percentage** (%)
	18-21	114	26.7
	22-25	225	52.7
Age	26 and above	88	20.6
	Total	427	100

Table 4.3 indicated the age group of respondents. The major respondents from the age range of 22 to 25 represent 225 students (52.7%). The second highest is from the age of 18 to 21of 114 students (26.7%) while the rest are from the age ranging 26 and above which represent 88 students (20.6%).

Table 4.4

Summary of Faculty and School

COB			**CAS**			**COLGIS**		
School/ Faculty	**Frequency**	**Percent (%)**	**School/ Faculty**	**Frequency**	**Percent (%)**	**School/ Faculty**	**Frequency**	**Percent (%)**
STML	25	5.9	**SMMTC**	4	0.9	**SOG**	26	6.1
SBM	65	15.2	**SQS**	27	6.3	**SOL**	11	2.6
SOA	33	7.7	**SSD**	23	5.4	**SOIS**	31	7.3
SOEFB	30	7.0	**SOC**	2	0.9	**STHEM**	10	2.5
IBS	7	1.6	**SEML**	16	3.7	**GSGSG**	38	8.9
OYAGSB	53	12.4	**AHSGS**	24	5.6			
TOTAL	**213**	**49.8%**		**96**	**22.8%**		**116**	**27.4%**

Legend:

COB

- (STML) School of Technology Management and Logistic
- (SBM) School of Business Management
- (SOA) School of Accountancy
- (SOEFB) School of Economics, Finance and Banking
- (IBS) Islamic Business School
- (OYAGSB) Othman Yeop Abdullah Graduate School of Business

CAS

- (SMMTC) School of Multimedia technology and Communication
- (SQS) School of Quantitative Science
- (SSD) School of Social Development
- (SOC) School of Computing
- (SEML) School of Education and Modern Language
- (AHSGS) Awang Had Salleh Graduate School of Arts and Sciences

COLGIS

- (SOG) School of Government
- **(**SOL) School of law
- (SOIS) School of international studies
- (STHEM) School of Tourism, Hospitality and Environmental Management
- (GSGSG) Ghazali Shafie Graduate School of Government

Table 4.4, illustrates the categorization of participants by college and school in Universiti Utara Malaysia (UUM). The summary indicates that student from College of Business (COB) represent the major respond rates compare to other colleges is 49.9% (213 students). The second highest value is represented by the College Of Government and International Studies (COLGIS) with a total of 116 students 27.2%. Finally, students from the College of Art and Science (CAS) shows almost equal respond rates compared to Colleges of Government and International Studies (COLGIS) which is 22.9% (98 students). (see Appendix B)

Table 4.5
Summary of Smartphone Usage

Items (Variable)		**Frequency** Total= 427	**Percentage** (%)
Period of using smartphone	Less than a Year	161	37.7
	1year to 3 years	190	44.5
	More than 3 years	76	17.8
	Total	427	100

Table 4.5 shows that majority of respondents agreed that they start using smartphone within 1 to 3 year(s) which recorded as 44.5% (190 students) from total responds rate while 37.7% (161 students) answered that they use smartphone less than a year and 17.8% (76 students) stated that they used their smartphones more than 3 years.

Table 4.6
Summary of Top Five Smartphone Applications Usages

Items (Variable)	**Frequency** Total= 427	**Percentage** (%)
Facebook	371	86.9
Browse internet	350	82
Download	238	56.0
E-Mail	232	54.3
YouTube	231	54.1

Table 4.6 shows the top five smartphone applications used by UUM final year and postgraduate students. Facebook application shows a high respond rate among overall application which achieved the highest positive respond rate which is

86.9% (371 students) while the students who browse the internet was recorded as the second top respond rate which is 82% (350 students). The rest used their phones to download applications using smartphones which is (238 student), E-mail application 54.3% (232 students) and finally 54.1% (231 students) agreed that they using YouTube application on their smartphone.

Table 4.7
Top Five Least Smartphone Applications Usage

Items (Variable)	**Frequency** Total= 427	**Percentage** (%)
Others (WhatsApp, Skype, Instagram & Groupon)	8	1.9
Amazon	14	3.3
Stock/Share market	20	4.7
M-Commerce	22	5.2
Purchase Ticket	27	6.3

Table 4.7 shows the top five lower respond rates of smartphone applications. The table above shows the five smartphone applications that are mostly not used by participant. WhatsApp, Skype, Instagram application and Groupon is recorded as the lowest response rate with only 8 students (1.9%) using this applications. Amazon is the second applications that are used to purchase goods and it is only used by 14 students while 20 students agreed that they used smartphone for financial purpose such as share and stock market. Finally, only 22 students (5.2%) used M-commerce application. Apart from that, only 6.3% (27 students) agreed that they use smartphone to purchase movie tickets.

Table 4.8
Top Five Smartphone Brands

Items (Variable)	**Percentage** (%)
Samsung	71.0
Sony Ericson	27.2
Nokia	23.4
Blackberry	81.5
HTC	86.2

Table 4.8 shows top five smartphone brand that received high respond rates. During data collection, there are eight popular smartphone brands that are listed in the questionnaire i.e. Nokia, Samsung, Sony Ericsson, Apple, Blackberry, HTC, Motorola and LG. The researcher chooses five brands that received top responds rates. Samsung is leading from overall response rate which recorded 71% (303 students) and followed by Sony Ericson, recorded 27.2% (116 students). Besides only 100 students or (23.4%) stated that they used Nokia smartphone and 79 student answered that they are using Blackberry phones, while 13.8% or 59 students answered that they are using HTC smartphones.

Table 4.9
Summary of Family Income

Items (Variable)	**Frequency** Total= 427	**Percentage** (%)
Less than RM1,000	114	26.7
RM 2,000- RM 5,999	256	60.0
RM 6000- RM 9,999	44	10.3
Above RM 10,000	13	3.0
Total	427	100

Table 4.9 shows the summary of family income of each respondent and from the data collected, the family income ranging from RM 2,000 to 5,999 recorded the highest respond rate of 60% (256 students). Furthermore, 26.7% (114 students) answered that their family income is less than RM 1,000. The lowest respond rate was achieved by family income in range of RM6,000 to RM 9,999 which represented as10.3% and apart from that, only 13 students or 3% was answered that their monthly family income is above RM 10,000. (see Appendix B)

4.3 Content Validity

Content validity is used to examine the accuracy of the questions (Fink, 2006). In other words, it is implemented to ensure the questionnaire had covered all variable which are measured in this study. The researcher sent the questionnaire to the senior lecturer of Universiti Utara Malaysia (UUM) for a review process to ensure the adequacy, comprehensibility, quality, clarity, comfort level, and appropriateness of the questions for research topic. The suggestions from the lecturer have given the researcher the opportunity to do changes in terms of the items arrangement, flow and sequencing of the questionnaire.

4.4 Construct Validity

Construct validity was employed in this study to determine the reliability of the measurement instruments before the main empirical study was conducted. Factor analysis is the general name for construct validity. Factor analysis was founded by Karl Pearson, Charles Spearman and others in the early 20th century (Johnson and Wichern, 2007). Fink (2006) stated that, construct validity was indicating that the certainty of the instrument measures what it is intended to measure. Hair *et al*., (2010) stated that Factor analysis is the appropriate technique to define the underlying structure of data matrix. This is because the factor analysis can reduce the wide ranging number of variable into manageable groups. Moreover, he stated that factor loading produced from factor analysis are used to narrow down the correlation between each score that can be concluded. The researcher identified the significant of factor loading by observing the score i.e. the higher the factor loading the more significant the data. Zikmond (2007) stated that factor analysis is used to reduce and reclassify large amount of data into small number of fundamental variables. Gibbons, Dempster, and Moutray (2009) stated that factor analysis has been widely used to assess the construct validity of a test or a scale.

Before conducting the main analysis, the researcher performed the factor analysis process in four variables that are used which includes independent variables (perceived ease of use and perceived usefulness) dependent variables (attitude and behavioural intention) and moderating variable (gender) because factor analysis is an established tool to determine construct adequacy of measuring variables (Cooper & Schindler, 2003). The total number of usable questionnaires for factor analysis is 427

questionnaires which is larger than the minimum number suggested by Hair et.al (2010).

The Kaiser Meyer Olkin (KMO) was conducted to measure the sampling adequacy. The researcher followed the KMO value as suggested by Hair *et al*., (2006) where the KMO values consist the following indicators: KMO value in the 0.90s is marvellous; 0.80s are meritorious; 0.70s are middling; 0.60s are mediocre; 0.50s and if KMO value is below 0.50 should be rejected or unacceptable. The KMO test is necessary to conduct this research because it is the best tool to measure the sampling adequacy of inter-correlations among variables. Form the four variables as stated the KMO value for Attitude (ATT) is 0.796, Behavioral intention (BI) 0.913, Perceived Ease of Use (PEU) 0.500 and Perceives Usefulness (PU) 0.924.

The Bartlett's test of sphericity is also used to test whether the data is appropriate to proceed with its significant level. The Bartlett's test of Sphericity is used to test the correlation matrix which determines whether factor model is applicable to use. Meanwhile, the Bartlett's Test of Sphericity in this study shows the chi-square value of (ATT) 721.334 at significance level of p=0.000, (BI) 1499.598 at significance l, (PEU) 114.387 at significance level of p=0.000evel of ap=0.000 and 1603.280 at significance level of p=0.000 see (Appendix C). Igbaria *et al*., (1995) state that for factor interpretation, the researcher set threshold valeue of 0.50 or higher on a specific factor and loading of no higher than 0.35 on other factors.

4.5 Factor Analysis

The main goal of factor analysis is to reduce the wide range variable number into manageable groups of factors (Lehman 1989). According to Hair *et al*., (2006), the rule thumb to explain the variance of the diaspora is that it should be more than 60% of the total variance. Churchill, (1999) stated that this technique assumes that there are only a few basic dimensions concerning the characteristics of a certain made to measure, and then it associates the characteristics to identify these key dimensions factor loading that was produced by factor analysis process and then is used to indicate the correlation of every feature and every score as the higher the factor loading, the greater importance that features are interpreting the factor matrix (Hair *et al*., 2006). Items that were less than .40 were rejected for consecutive hypotheses testing. Factor analysis can be used as data reduction method or structure detection (Hair *et al*., 1998). According to Cooper, Schindler & Sun 2003 the main purposes of factor analysis are:

1) To examine the validity of measurement construct concept
2) To reduce the number of variables.
3) To determine the structure of the relationship between variables, by specifying a set of underlying dimensions

4.5.1 Process of Factor Analysis

In order to develop a valid and reliable assessment, the tool that is used to examine smartphone technology acceptance among (UUM) students is a questionnaire (quantitative method) which contains 31 items which covers four variables; independent variable represented by perceived usefulness (10 questions), perceived ease of use (9 questions), the dependent variables test by attitude (4 questions) and behavioural intention (8 questions).

The perceived usefulness were examined in order to determine how the usage of smartphone technology improves users' performance while perceived ease of use is to measure how (UUM) students believe that using smartphone technology will be free of effort. Attitude was used in order to measure individual's positive or negative feeling towards smartphone technology and behavioural intention was intended to examine the favourable or unfavourable attitude of a person towards the smartphone technology.

Students' point of view about the four items was assessed through the 5-point likert-type scale in the form of "strongly disagree, disagree, neither disagree nor agree, agree and strongly agree" (see Appendix A). Next, the factor analysis process was done to extract positive and negative feedbacks of respondent with the content validity. The factor analysis process was done on collected data and the summary of factor analysis is displayed in table 4.11 and 4.12. After calculating the factor analysis, the factor loading below 0.40 was omitted from the analysis. Hair *et al*., (1998) classified loadings below 0.40 as so low (a loading above 0.50 is acceptable). However, Igbaria, Iivari, & Maragahh (1995) stated that, the criteria used to identify

and interpret the factors was that a particular item should load 0.50 or higher in a particular agent and have a load does not exceed 0.35 to other factors.

The item that are loaded more than one factor should be deleted due to violations of simple structure factor solutions (only one variable was removed for each factor loading); Double loading makes it difficult to interpret the output. Double loading happens when the score is at least .50 or more than one factor. In addition, the items should be removed if an item loaded in factor where theoretically it seems unreasonable for this component to be associated with other items in the coefficient (Hair *et al*., 1992; Nunnally, 1978).

Attention was given to detect the difference between factor loading values and loading values obtained from the other factors to be 0.50 and above. The items should be removed with a Measure of Sampling Adequacy (MSA) if it is less than 0.50 in the trace capture prevention. Considering these values, some items were removed from the analysis ten items were removed, finally the factor loading value for 21 items were found above 0.5. These are the items which are deleted during loading process; independent variable (PU1, PU2, PEU1, PEU2, PEU3, PEU4, PEU5, PEU6, PEU8) and dependent variable (BI8) were deleted. There was no item deleted from attitude because all items in ATT were identified above .05.

There are a total 31 variance examined but only 21 items were cumulated under four factor (PEU, PU, ATT, BI). First factor was represented by dependent variables which are attitude (ATT) and Behavioural intention (BI). Second and third

factor were represented by independent variable of perceived usefulness (PU) and perceived ease of use (PEU). These four factors were identified as the important factor in the analysis and this together explained a major proportion of the total variance of the elements and scale of smartphone technology acceptance. The result of component matrix and rotated component value is shown in table 4.10. The Cronbach's Alpha value of reliability analysis for each of the variables are as follows: Perceived Usefulness 0.896; Perceived ease of use, 0.654 and attitude 0.843 and behavioural intention, 0.893 (refer Appendix D).

The anti-image correlation matrix was used to determine the correlation between one variable. Moreover the researcher followed the rules of thumb suggested by Hair *et al.*, (2010) where all variables in measuring sampling adequacy must be above 0.5. Therefore the researcher ensured the sampling adequacy for all variables that appears in diagonal anti-image correlation matrix was at the acceptable level which is above 0.5.

4.6 Reliability Analysis

Hayes (1998) defined reliability as the extent to which measurements are free from random-error variance (p. 36). Reliability analysis is a tool to indicate stability and consistency of measurement instrument which allows the researcher to estimate the errors and goodness of items (Sekaran, 2003). Reliability analysis indicates the stability and consistency, of the measurement instrument and also helps to evaluate the goodness of measures (Cavana, *et al.,* 2000). The main reason for conducting reliability testing is to determine how appropriate a set of components may fit into some sources of variability measured using Cronbach Alpha coefficient. To ensure reliability, Cronbach's alpha is an indicator of reliability index for quantitative data,

which pointed out how well the items in a set of correlated positively to each other (Coakes, Steed & Ong, 2010). Nunnally (1979) argued that the nearer the Cronbach alpha value to 0.5-1.0 it indicates the higher the internal consistency. Moreover, Sekaran (2003) suggested that 0.50 is the minimum value of acceptable reliability in behavioural research. The researcher conducted Exploratory Factor Analysis (EFA) in order to explore the effectiveness of data. All the information in this research was measured using five-point likert scale ranging from strongly disagree to strongly agree. Table 4.10 illustrates the summary of reliability statistic.

4.7 Reliability Statistic

Table 4.10
Model Summary of Reliability Statistic

Item	Number of Items	Items dropped	Cornbach's Alpha
Perceived Usefulness (PU)	10	2	0.896
Perceived ease of use (PEU)	9	7	0.654
Attitude (ATT)	4	-	0.843
Behavioural intention (BI)	8	1	0.893

Table 4.10 point out the Cronbach alpha reliability coefficients values of three variables of this study. Since the result of Cronbach alpha reliability value obtain from range 0.654 to 0.896 (as recommended by Hair *et al*., 2006) When subjected to reliability testing of Cronbach Alpha value is more than 0.5 for all items are sufficient enough for this study. Thus, the researcher assumes the data is sufficient in conducting further process.

There are two independent and two dependent variables in this study. Perceived usefulness (PU) and Perceived ease of use (PEU) are the independent variables while Attitude and Behavioral Intention are the dependent variables. Perceived usefulness has eight items i.e, PU3, PU4, PU5, PU6, PU7, PU8, PU9, PU10 and all of eight items showed reliable cronbanch's alpha of 0.896 In perceived ease of use, there are only two items i.e. PEU7, PEU9 with the cronbanch's alpha value of 0.654. The dependent variable represented by attitude is ATT1, ATT2, ATT3, ATT4 with the cronbanch alpha of 0.843 & behavioural intention has zeven items which are BI1, BI2, BI3, BI4, BI5, BI6, BI7 and the cronbanch's alpha for this dependent variable is 0.893.

4.8 Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted to test the validity. As stated before, the loading value suggested by Hair *et al*., (2010) is all loading items should be at least 0.50 to be accepted. There are ten items that was deleted during Confirmatory Factor Analysis (CFA) process which have the communality value below 0.50 and cross-loaded on more than one component.

At the beginning there are a total of 31 variables stated in this study that are used to measure smartphone acceptance among (UUM) students and from this, 10 items were deleted i.e. PEU1, PEU2, PEU3, PEU4, PEU5, PEU6, PEU8, PU1, PU2 and BI8. This is because all items possesses insufficient factor loading. During factor loading process, the data reduction point only given below (0.50) and it was undertaken as recommended by Field, (2009). Consequently, the factor loadings value indicates the survey results as all above the threshold of 0.50 (Kaiser, 1974).

Thus both independent and dependent variables in this study have sufficient data for further analysis.

4.9 Total Variance Explanation of Acceptance of Smartphone Technology

Table 4.11 and 4.12 explain the factor loading and communality value of each items. Factor analysis result of independent variable which is the perceived usefulness (PU) explains the results of communality value for eight items and (PEU) explains communality value of two items. Table 4.12 shows the communality value of dependent variable which Attitude has four items and eight items represented by behavioural intention (BI). The researcher followed the standard principal suggested by Igbaria *et al*., (1995), to find and interpret the factor; each element must load 0.50 or more factor and 0.35 or below on another factor.

Table 4.11
Factor Analysis for Independent Variable

Code	Item	Loading
	Perceived usefulness	
PU3	Smartphone technology enables me to accomplish tasks more quickly.	0.531
PU4	Smartphone Technology supports critical aspects of my job.	0.509
PU5	Using Smartphone technology increases my productivity.	0.616
PU6	Using Smartphone technology improves my job performance.	0.640
PU7	Using smartphone technology allows me to accomplish more work than would otherwise be possible.	0.570
PU8	Using smartphone technology enhances my effectiveness on the job.	0.607
PU9	Using Smartphone technology makes it easier to do my job.	0.640
PU10	Overall, I find the Smartphone technology is Useful in my job.	0.524

Eigenvalue: 4.639
Variance: 57.982
Reliability: 0.896

	Perceived Ease of use	
PEU7	My interaction with the smartphone technology is clear and understandable.	0.743
PEU9	Overall I find smartphone technology is easy to use.	0.743
	Eigenvalue:1.486 **Variance**: 74.300 **Reliability:** 0.654	

Table 4.11 shows the factor analysis results for independent variables. The factor analysis result for the first independent variable which is the perceived usefulness (PU) indicates the loading range of 0.509 - 0.640 and it was above the minimum value suggested by (Hair *et al*., 2006). There are ten measuring items for (PU) (survey questions) in this research and all eight items are explaining communalities variance of 57.982 percent with Eigen value of 4.639 which is above one.

The second independent variable is the perceived ease of use (PEU). The loading value of two items and both loading value was 0.743. The three items was explained as 74.30 percent. As expected, all loading value for this research is above 0.5 which exceed the minimum recommended value suggested by Hair *et al*., (2010).

Table 4.12
Factor Analysis for Dependent Variable

Code	**Item**	**Loading**
	Behavioural Intention	
ATT1	I like using smartphone technology.	0.743
ATT2	I feel good about using smartphone technology.	0.733
ATT3	I think positively toward using smartphone technology.	0.707
ATT4	The smartphone technology make easy for me to maintain relationship with friends and family.	0.550
	Eigen value:2.732 **Variance**: 68.312 **Reliability:** 0.843	
BI 1	I intended to use smartphone technology.	0.631
BI 2	I predict that I would use smartphone technology.	0.614
BI 3	I plan to use smartphone technology.	0.703

BI 4	I intend to be a heavy user of smartphone technology.	0.524
BI 5	I intend to use smartphone technology in near future.	0.653
BI 6	I am willing to use smartphone technology.	0.629
BI 7	I will use smartphone technology in regular basis in near future.	0.560
	Eigen value:4.313 **Variance**: 61.621 **Reliability:** 0.893	

Table 4.12 indicates the summary of factor analysis for dependent variables (Attitude and Behavioural Intention) of smartphone technology acceptance with loadings value (i.e. correlations) in the range of 0.524-0.743. These factors explained attitude is 68.3 percent variance trough varimax rotation and the eigenvalue value is 2.737. As expected the result of all loading value was above 0.60. While the Eigen value for behavioral intention was 4.313 and total variance explained by behavioral intention was 61.62 percent at reliability of 0.893.

4.10 Correlation Analysis

The correlation is a statistical method used to explain the strength and direction of a linear relationship between variables used in research (Coakes, 2005 & Pallant, 2007). Besides that, Baba (2004) stated that correlation analysis was used in research to measure the power of the affiliation between numerical variables. Correlation refers to the degree of relationship between variable and regression which are used to predict dependent variable by using independent variable (Hair *et al*, 2006). Thus, in this present study, the researcher attempted to examine the correlations between perceived ease of use, perceived usefulness Attitude and behavioural intention of smartphone technology acceptance. According to Hair *et al*., (2006), the limit for the correlation coefficients is less than 0.80. The existence of the correlation between dependent and independent variables is important and preferred

to be more than 0.3 (Pallant, 2007). The correlation variable was conducted to identify whether there is any multicollinearity problem.

Table 4.13
Correlation of Variable

Factor	PU	PEU	ATT	BI
PU	1.00			
PEU	0.441**	1.00		
ATT	0.454**	0.530**	1.00	
BI	0.464**	0.524**	0.749**	1.00

** Correlation is significant at the 0.01 level (2-tailed)

Table 4.13 shows a summary of correlation value between variables. The SPSS output indicate that there was a significant relationship between independent (PU and PEU) dependent (ATT and BI) variables P<0.01 (see Appendix F). The outcome of correlation value indicates that all value is below 0.01. The Process of Correlational Analysis (PCA) was conducted to measure the strength and relationship between independent variables (perceived ease of use and perceived usefulness) and dependent variable (Attitude and Behavioural intention). The reason why (PCA) was conducted in this research is to avoid two or more variable correlated that will then increase the size of error at the same time undermined the analysis (Coakes al,. 2010).

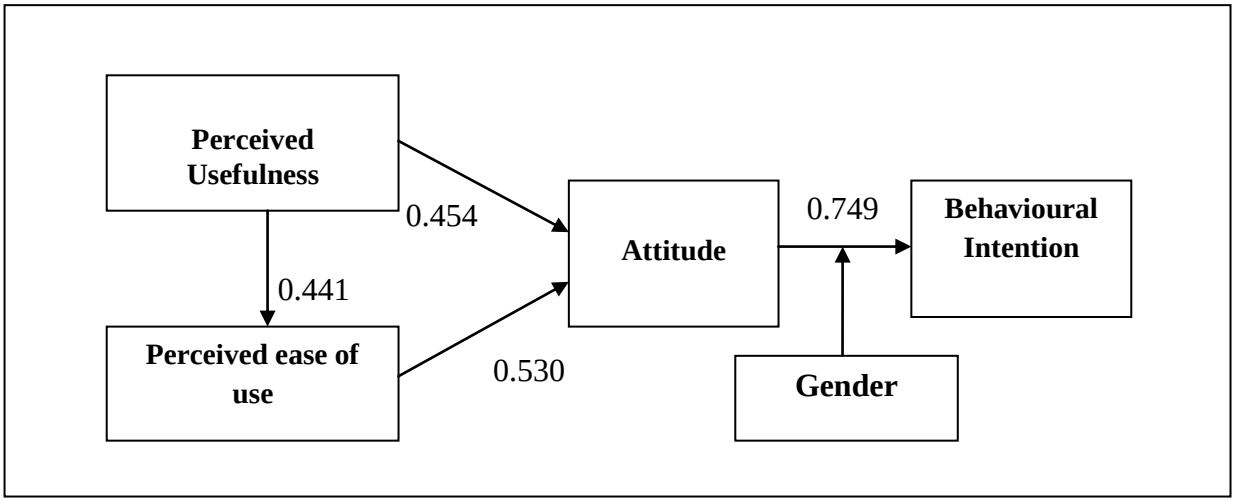

Figure 4.1
Correlation of Research Model

From Figure 4.1, it seems that based on the SPSS 19.0 output of correlation result above none of the variable is highly correlated with any other variable. Pearsons' correlation coefficient (*r*) is employed to describe the strength and direction of the relationship between three variables. According to Hair *et al*., (2010), multicollinearity is defined as the degree to which other variables can explicate a variable in the analysis. Tabachnick & Fidell, (2007) stated that multicollinearity has the potential to recognize if there is a high correlation between the variables. All correlation values given above are below the threshold of 0.9, thus the researcher assumed that there is no problem of multicollinearity between the variables under investigation.

4.11 Research Model

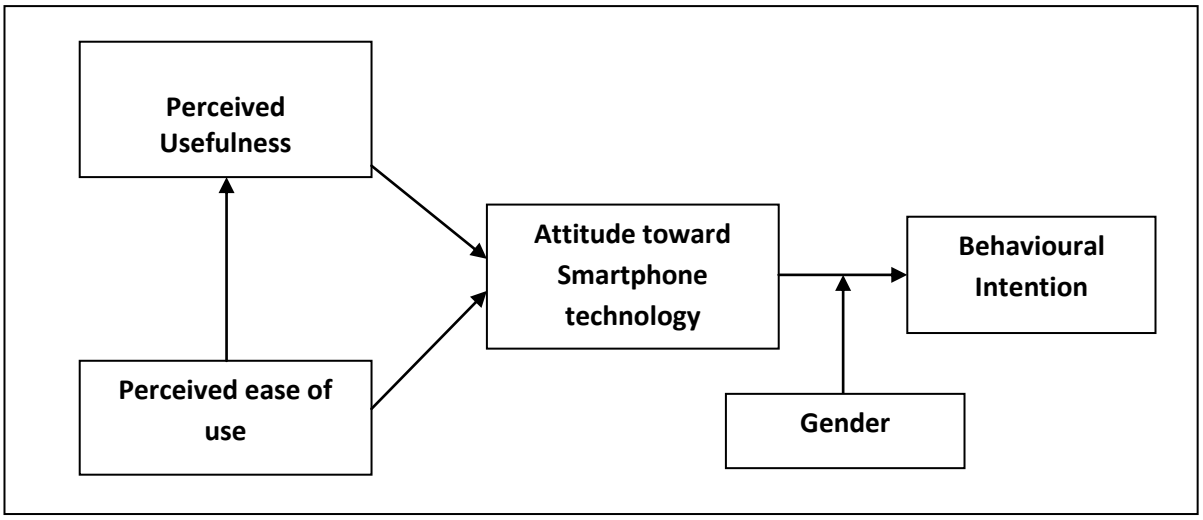

Figure 4.2
Research Model

Figure 4.2 shows the original research model used in this study. This model has two independent variables (perceived ease of use and perceived usefulness), two dependent variables (attitude toward smartphone technology and Behavioural intention) and gender as moderator to test the relationship between attitude and behavioural intentions. This model was originally adopted from Davis *et al*., (1986) and gender was used as moderator to test between attitude toward smartphone technology and behavioural intention.

4.12 Multiple Regression Analysis

Multiple regression analysis was conducted in this study to understand the mediating effect that help the researchers to answer the research hypothesis. The multiple regression analysis was used to assess the hypothesized relationship between independent (PU, PEU) and dependent variables (ATT).

The reason why hierarchical multiple regressions was employed in this research is because according to Baron and Kenny (1986), hierarchical multiple regression is the most suitable test in testing the mediating relationship compared to other statistical method. Furthermore, before conducting multiple regressions analysis to ensure the data is valid, the researcher had conducted case wise diagnostics test and the result shows that there is no case of outlier's detection.

Table 4.14
Model of Multiple Regression Analysis

1	**IV** (Perceived ease of use) ⟹ **DV** (Attitude)
2	**IV** (Perceived ease of use) ⟹ **MV** (Perceived usefulness)
3	**IV** (Perceived ease of use) ⟹ **DV** (Attitude) **MV** (Perceived usefulness)

Table 4.14 explains three steps suggested by Baron and Kenny (1986). The meaning of IV on the table above is the independent variable while MV is representing the mediating variable and finally DV is the dependent variable. This used as guidelines to conduct the hypotheses testing to measure whether the hypotheses that are used in this study is statistically significant or not.

There are three steps in conducting hierarchal regressions as suggested by Baron and Kenny (1986). First, independent variable (PEU) was typed to regress with dependent variable (ATT). In step two, independent variable (PEU) regressed with mediating variable (PU). In step three, independent variable (PEU) was included to regress with mediating variable (PU) and independent variable (ATT).

4.13 Summary of Multiple Regression

Tables 4.15.1 until 4.15.3 explain the summary of multiple regression analysis. The researcher tested the relationship between independent variable (Perceived ease of use) and dependent variable (Attitude) towards smartphone technology acceptance among (UUM) students. The (R_2) value indicates how well the coefficient of a set of variables that are able to predict a specific outcome.

Table 4.15.1
Model summary of Perceived Ease of Use and Attitude

Variables	**R Square ($R_{2)}$**	**Beta**	**F**	**Sig.**
PEU ATT	0.333	0.577	210.054	0.000

From the regression summary above, Table 4.15.1 the analysis is indicating there is significant relationship between independent variable (perceived ease of use) and dependent (Attitude) at beta vale of 0.577 and the regression of fit is (R_2 =0.333) which mean the model has accounted for 33.3 percent of the variance in the independent variable, while the overall relationship of the model is statistically significant (F= 210.054, p< 0.000). The beta value is (β= 0.577) which indicates there is a significant relationship between PEU and ATT. In addition, PEU and ATT have significant values at 0.000 which is less than 0.5. Therefor the hypothesis is supported. A complete analysis can be referred in (Appendix F).

Table 4.15.2
Model Summary of Perceived Ease of Use and Perceived Usefulness

Variables	R Square (R_2)	Beta	F	Sig.
PU PEU	0.272	0.522	156.727	0.000

Table 4.15.2 explains the output of multiple regression result containing the correlation between PU and PEU. The goodness of fit is (R^2 =0.272), which indicates that PU has significant relationship with PEU which explains 27.2 percent. This indicates that PU and PEU has highest predictive power in smartphone technology acceptance among UUM students. The overall model is statistically significant (F=156.727). From the table above (PU) is statistically significant wit (PEU) at (p <0.000). PU has significantly relate to (PEU) at (β= 0.522). Thus the researcher assumes that this hypothesis is supported.

Table 4.15.3
Model Summary of mediation relationship of Perceived Usefulness on Perceived Ease of Use, and Attitude

Mediating variable	R Square (R_2)	Beta	F	Sig.
PEU PU ATT	0.255	0.505	144.622	0.000

The result from multiple regression analysis reveal that PU has mediating relationship with PEU and ATT. Through the data analysis the findings indicate revealed that there is significant relationship exist among three variables (β= 0.505, p< 0.000). The result multiple regression analysis indicate that goodness of fit at (R_2 = 0.255), which PU explains 25.5 percent of variance PEU and ATT which is statistically significant at F= 144.622. Therefore the hypothesis is supported. According to Baron and Kenny (1986), there are three conditions that must be followed by researchers to determine full or partial mediation.

(a) The mediator and the exogenous variables,

(b) The mediator and the dependent variable and

(c) The exogenous and independent variable.

In this study, reduction of beta value happened between table one (0.577), two (0.527) and table three (0.505) where the relationship weakens and represents substantively concrete evidence for partial mediation refer (Appendix F). Thus, the researcher concludes that the result had partially supported the hypothesis which predicted the smartphone technology acceptance among (UUM) students.

4.14 Hierarchal Regression Analysis

The hierarchal regression analysis was conducted to test the moderation effect between attitude and behavioral intention. In this study gender was used as moderator to test the relationship between attitude and behavioral intention. There is three steps was conducted in analyses hierarchal regression analysis between attitude and behavioral intention.

Table 4.16
Model of Hierarchal regression process

1	**IV** (Attitude)	⟹	**DV** (Behavioral Intention)
2	**MV** (Gender)	⟹	**DV** (Behavioral Intention)
3	**IV** (Attitude) **MV** (Gender)	⟹	**DV** (Behavioral Intention)

From the table above (IV) is independent variable which represent attitude and (DV) is behavioral intention meanwhile (MV) is moderating variable which represent gender or sex. This study using three step that suggest by Baron and Kenny (1986) first, independent variable (ATT) was typed to regress with dependent variable (BI). In step two, Moderating variable (Gender) regressed with Dependent variable (BI). In step three, independent variable (ATT) was included to regress with moderating variable (Gender) and independent variable (BI).

4.17 Summary of Hierarchal Regression Analysis

Tables 4.17.1 to 4.17.3 explain the summary of hierarchal regression analysis. The researcher use gender as moderator to test the relationship between dependent variable Attitude (ATT) and dependent variable Behavioral Intention (BI) towards smartphone technology acceptance among (UUM) students.

Table 4.17.1
Summary of Hierarchal Regression Analysis for Attitude and Behavioral Intention

Variables	**R Square (R_2)**	**Beta**	**F**	**Sig.**	**VIF**
ATT BI	0.635	0.797	727.934	0.000 0.000	1.000

Table 4.17.1 shows there is significant relationship between ATT and BI p< 0.000. The R_2 value is 0.635 which indicate that ATT plays an important role with BI in explain 63.5 percent of variance. The beta value is 0.797 which indicates that ATT has contribution in explaining the BI. The R_2 statistically significant with F=727.934 at the VIF value of 1.000.

Table 4.17.2
Summary of Hierarchal Regression Analysis for Gender and Behavioral Intention

Variables	**R Square (R_2)**	**Beta**	**F**	**Sig.**	**VIF**
Gender BI	0.635	0.797 -0.003	363.113	0.000 0.911	1.000 1.000

Table 4.17.2 explains the hierarchical regression between Gender and behavioural intention. The result show an R_2 value of 0.635, which indicate that Gender plays an important role in BI and it explain 63.5 percent of variance. On other hand the beta value for Gender is 0.797 and BI is -0.003. In addition Gender has significance value of 0.000 but BI has no significant value (0.911) which above than 0.05.This evident confirms that there is no significant relationship between Gender and BI. The VIF value for both variable is 1.000 at F= 363.113.

Table 4.17.3
Summary of Moderating Test between Attitude, Gender, and Behavioral Intention

Moderating Variables	**R Square (R_2)**	**Beta**	**F**	**Sig.**	**VIF**
ATT	0.637	0.865	243.752	0.000	3.149
Gender		0.381		0.123	69.684
BI		-0.395		0.117	72.312

Table 4.17.3 indicates the moderating test between ATT, Gender, and BI. The R_2 value is 0.637, which mean ATT explain 63.7 percent of total variance. The hierarchal regression analysis reveals that there is no significant relationship for BI (p> 0.123) and Gender (p> 0.117) which above 0.05. From the result the researcher found there is no significant relationship for gender and BI. In addition the beta value for ATT (0.865), BI (0.381) and Gender (-0.395) at F=243.752. The (VIF) value for ATT (3.149), Gender (69.684) and BI (72.312).

Overall the researcher found that Gender fails to moderate in explain the relationship between ATT and BI. This because the VIF value is 72.312 and furthermore there is

no significant relationship of Gender and BI (see Appendix G). This because the significance value for Gender and BI is above 0.05. Based on the statistical result this study strongly believes that Gender cannot use as a predictor in test the relationship between ATT and BI on smartphone technology acceptance among UUM students. Therefore the researcher concludes that there is no moderation effect of gender on ATT and BI.

4.18 Conclusion

This study discussed the smartphone technology acceptance among (UUM) students. The researcher conducted a quantitative research where the data was collected from 500 students to test the reliability of measuring instrument trough Cronbach's Alpha Coefficient. The researcher also conducted the factor analysis in order to measure the factorability of all measuring items. The findings show that perceived ease of use, perceived usefulness and behavioral intention, has greater contribution to the smartphone technology acceptance among (UUM) students. The following chapter will discuss the findings of this chapter as well.

CHAPTER FIVE

CONCLUSION AND RECOMMEDATION

5.0 Introduction

This chapter presents the discussion of statistical result stated in chapter four about smartphone technology acceptance among (UUM) students. Firstly, the contribution of research is presented as follow; recapitulation of the study findings, discussions of hypotheses testing result, study findings, contribution of research, theoretical contribution, discussion of hypothesis testing, conclusion, limitation and recommendation for future research. The revised model of user smartphone technology acceptance based on the significant result obtained from the main hypotheses is also presented.

5.1 Recapitulation of the Study Findings

Based on the Technology Acceptance Model (TAM) by Davis (1986), this study investigate smartphone technology acceptance among (UUM) students. This study was undertaken to find the five research questions:

1. What is the relationship of perceived ease of use in attitude towards smartphone technology?
2. What is the relationship of perceived ease of use and perceived usefulness?
3. What is the mediating effect of perceived usefulness on the relationship between perceived ease of use and attitude towards smartphone technology?

4. What is the relationship between attitude towards smartphone technology and behavioural intention of smartphone technology?
5. What is the moderating effect of gender on the attitude and behavioural intention of smartphone technology relationship?

The data analysis has suggested that there is four potential factor affecting smartphone technology acceptances among (UUM) students and they are perceived ease of use and perceived usefulness, attitude and behavioral intention. Surprisingly gender fail to moderate the relationship between attitude and behavioral intention Based on these three factors, the researcher developed research hypothesis.

5.2 Hypotheses Testing Results

This study concerns on the relationship between PU, PEU, ATT and BI on smartphone technology acceptance among UUM students. The result of data analysis shows that all hypotheses are supported. Table 5.1 shows the summary of the hypothesis findings.

Table 5.1
Summary of Result from Hypothesis Tested

	Path of Relationship	Result
H1	There is a significant relationship between perceived ease of use and attitude	**SUPPORTED**
H2	There is a significant relationship between perceived ease of use and perceived usefulness of smartphone technology.	**SUPPORTED**
H3	There is the mediating effect of perceived usefulness on the relationship between perceived ease of use and attitude.	**SUPPORTED**
H4	There is significant relationship between attitude towards smartphone technology and behavioral intention of smartphone technology	**SUPPORTED**
H5	There is moderating effect of gender on the attitude and behavioural intention of smartphone technology acceptance among UUM students	**NOT SUPPORTED**

5.3 Contribution of The Research

This study has mainly contributed to the body of knowledge of the smartphone technology acceptance among (UUM) students. The findings of the study has a significant contribution i.e. perceived ease of use, (PEU) perceived usefulness (PU) attitude (ATT) and behavioural intention (BI) which explain the managerial implication of smartphone technology acceptance among (UUM) students. Meanwhile the gender as a moderator was fails to explain the relationship between

attitude and behavioral intention of smartphone technology acceptance among UUM students.

5.4 Theoretical Contribution

The quantitative data collection method was utilized in this study to examine the relationship between Perceived Ease of Use (PEU), Perceived Usefulness (PU) and Attitude (ATT) and Behavioural Intention (BI). The scale variables were adopted from previous research by Davis (1986) which was applied in various fields by many researchers (Wang, Huang& White (2013); Wong, (2012); Wu & Wangsa (2005.

This study has found several statistic significant relationships between perceived ease of use, perceived usefulness attitude and behavioural intention trough literature review. The finding of the study can be applied in educational field. This study discovered the UUM students' perception towards smartphone technology and on how this technology was integrated in to development of their personal task. The next section presents the discussion of hypothesis testing.

5.5 Discussion of Hypothesis Testing

This study is sought to explore smartphone technology acceptance among (UUM) students. In addition, this study is intended to test the empirical relationship between perceived ease of use, perceived usefulness attitude and behavioural intention. In addition the result of the study reveals that there is significant correlation between four variables and smartphone technology acceptance among (UUM) students. In this study, each hypothesis was discussed separately to explain the impact of smartphone technology acceptance among (UUM) students.

5.5.1 H1: There is a significant Relationship Between Perceived Ease of Use and Attitude.

The finding of this hypothesis shows that Perceived Ease of Use (PEU) has significant relationship with Attitude (ATT). This indicates that PEU significantly influenced ATT on smartphone technology acceptance. This is because (UUM) students believe that using smartphone technology will improve their job performance. It was also due to the commercialization of smartphone which had begun with the multitask features available in the smartphone adopted by academician, professionals, commercial entities, and media to accomplish their task (Jin & von Zedtwitz, 2008). The significant relationship of PEU towards ATT suggested that PEU is a good predictor in enhancing smartphone technology adoption and to support this argument, there are few studies that have discovered that PU is the stronger predictor of ATT i.e. (Dohan and Tan (2013); Ariff, et.al.,(2013); Zheng et,al., (2013); Deng, (2013). Arguably, the findings of this hypothesis confirmed that PU have significant relationship towards ATT and it was theoretically supported with the conveyed information in chapter two.

Although the findings show that PEU has significant impact on ATT towards smartphone technology acceptance but there are some studies which indicate that PEU has less impact on ATT such as Abdullah *et al*., (2013) and Alshehri, Drew & AlGhamdi (2013). Moreover, there are few smartphone based studies which mainly focused on ATT instead of PEU such as Biscaia, *et al*., (2013); Weng and De run (2013) and Maiyaki (2013). Davis (1986) stated that behavioural intention is used to predict actual usage of a person towards specific technology or device. Mothar (2013) stated that most people in Malaysia used smartphone purposely in indicating

their personal identity and to reflect their financial status to others. This argument was supported by Karim *et al*., (2013) where youth are more likely to consider mobile phones for attractive physical look and use these device purposely to highlight their social status.

However in this study, the empirical findings and statistical result confirms that the PEU has significant effect on ATT. Responding to the hypothesis stated above, this study found that postgraduate and undergraduate students in UUM strongly believe that using smartphone technology for their personal task will improve their job performance. Reilly and Shen (2011) stated that the collaborative note-taking application that are available in smartphones motivate the student to learn quickly. The findings of this research confirmed that (UUM) students have the confidence and are all well experienced when using smartphone technology.

5.5.2 H2: There is a significant Relationship Between Perceived Ease of Use and Perceived Usefulness of Smartphone Technology.

The empirical findings of this research answered the second hypothesis where Perceived Ease of Use (PEU) has significant relationship with Perceived Usefulness (PU). Moreover, the finding is significantly correlated with the research done by Mokthar *et al*., (2013) which found that Malaysian undergraduate university students choose smartphone based on the functions and usability of the device. It clearly implies that the practical experience and functional features of smartphone technology leads to user's adoption toward this technology. This was supported by Lane (2012) as the availability of cheap and free application promotes the prevailing

of smartphone. Moreover, Ghorban (2012) stated that the high price of the smartphone did not interfere Malaysian consumer's decision to adopt the smartphone. Hence, PEU is a good predictor of user acceptance towards certain technology and PU had become good influencer of user belief, thus this study perceived that practical experience of smartphone technology in accomplishing various task might support this hypothesis.

However there are some studies which stated that PU and PEU do not have relationship such as Sicotte, Taylor and Tamblyn's (2013). On the other hand, Morris (2009) found that older age people are less likely to use computer based technologies than younger people. In this study, the researcher used UUM final year and post graduate students as respondents and based on statistical summary the overall respondents are from the age group ranging between 18 to 26 years old. Apart from that, the statistical result in this study indicates that all UUM students is well known about smartphone technology.

A comparison between PEU and PU indicates that smartphone technology had become the seed to the improvement of (UUM) students personal task. There was an evidence which supports this argument as Karim *et al*., (2010); Osman *et al*., (2011) found that Malaysian youth use their smartphones for entertainment and socialization purpose and their favourite application is camera, SMS, voice call, music and alarm. This is because smartphone has the ability to do job quickly with the support of high speed internet connectivity (Mothar *et al*., 2013). Notably, the findings are supported by previous study by Tsai, Peng & Ho (2013), which was conducted to explore how design influenced smartphone adoption among consumer and they find out PEU and PU had influenced smartphone adoption. This study

strongly claimed that PEU has positive relationship to PU. Therefore, with empirical evidence, the researcher confirmed that PEU and PU have significant relationship with smartphone technology acceptance among (UUM) students.

5.5.3 H3: There is The Mediating Effect of Perceived Usefulness on the Relationship between Perceived Ease of Use and Attitude Toward Smartphone Technology Acceptance.

The hypothesis stated above was supported which there is mediation relationship between PU, PEU and ATT. The findings had justified that the implementation of smartphone technology in students' everyday life significantly influenced the student's perception and adoption towards these devices. It was supported by Aldhaban, (2012) and Dixit *et al*., (2011) as smartphone is a highly-innovative ICT product and the ownership of the device is growing exponentially among students. Moreover, Reilly and Shen (2011) and Karim *et al*., (2010) found that smartphone is an attractive tool for students and the majority of Malaysian university students prefer expensive phones and always love to explore the latest models available in market. Apart from that, Mokhlis and Yaakop (2012) stated that there are three factors that influenced Malaysian university students to own the smartphone such as price, innovative features and recommendation. On the other hand, Syed *et al*., (2008) stated that most university students in Malaysia view smartphones as a necessity tool to alter their learning method.

Meanwhile the evidence from other extent literature shows that students was unaware with the actual potential of smartphone hence this device is highly customized in pocket size computing power and running in complex software and can store huge amounts of data (Woodcock, Middleton & Nortcliffe, 2012). Osman *et al*., (2011) mentioned that smartphone with its numerous capabilities and functions seemed wasted because average Malaysian youth are still using their smartphones for common use such as calling and texting. Meanwhile, Mokhlis and Yaakop (2012) revealed that the majority of Malaysian university students is looking for expensive phones but the amount of money they received for personal expense was not sufficient to cover their financial needs. Moreover, Osman (2011) also revealed that, generally in Malaysia, smartphone would be an indicator of status, prestige, and lifestyle for younger adult to reflect their purchasing power. In other case, Mothar *et al*., (2013) stated that even though smartphones have a powerful internet surfing capacity and large storing memory, it is still not suitable in doing heavy-duty work as well as PC or laptop. For instance, when students work on assignment by using PC or laptop, it allows them to feel comfortable with a larger screen and keyboards which are not included in smartphones. Thus, it practically indicates the (UUM) students belief that using smartphone technology will reduce the difficulty of handling work and to improve users' performance.

All in all, the finding was consistent with some previous findings as well as to the TAM model, Liu and Ma (2005) found that PU, PEU and ATT have a mediation relationship. On the other hand, De Gournay and Smoreda,(2003) and Mc veigh, (2003) stated that although there is various forms of new technology available in market, the mobile phone in particularly has been perceived as a significant symptom

and facilitator of individualizing youth culture. This can be particularly linked to the issue of smartphone technology was widely accepted by (UUM) students because they view smartphone technology as a facilitator to assist their personal tasks.

5.5.4 H4: There is significant relationship between attitude towards smartphone technology and behavioral intention of smartphone technology.

After testing the hypothesis the result revealed that, attitude and behavioral intention has significant relationship on intention to adopt smartphone technology among UUM students. It was match with most previous researches which shows that attitude have significant relationship with behavioural intention (Auter, 2007; Jongepier 2011; Osman, Sabudin, Azlan & Tan 2011; Susick, 2011). Morris *et al*., (2009) asserted that attitude is the efficient predictor of behavioural intention in variety of contexts. In addition Teo (2010) postulated that attitude plays an important factor in affecting success of any system. In addition attitude referred to the belief of that person towards an object that can easily controlled by a person. Meanwhile Chaudhuri & Holbrook (2001) found that consumers' brand trust is closely related to behaviour intention and attitudinal loyalty. Malhotra (2005) stated that behaviour represent customers' intention to do something that are influenced by attitude. Gawronski (2007) stated that there are several factors that automatically influenced attitude which are motivation and evaluation of characteristics.

The reason behind significant relationship between attitude and behavioral on smartphone technology acceptance among UUM students is basically smartphone is equipped with various software and applications such as quick internet access, large screen and fastest operating system and these devices also replaced several tasks that normally should have

been done by using a laptop which influence UUM student to totally rely on smartphones technology. It supported by Lane & Manner (2012) which every person choose the smartphone applications that are matched with their personality and individual differences. Furtheremore Ling & Yuan, (2012) state that there are several external factors that make consumers to have positive attitudes towards smartphone such as smartphone can access internet quickly than traditional mobile phone made enjoyable experience among smartphone users. It supported by Davis, (1989) stated that user would have positive attitude toward the system if they realized that system is useful and easy to use.

The researcher found that past adoption behavior of UUM students was influence the continual adoption toward smartphone technology. Furthermore the reason behind this continuous adoption was because there are varieties of smartphone in market with low price and the evolution of smartphone technology enables these devices uses as personnel computer which significantly influenced UUM student to own these devices. Meanwhile smartphones technology allow UUM students to satisfy their needs and be able to stay connected with others either through social networking sites or using live chat integrated through smartphones. Hassan *et al*., (2011) asserted that individual usage behaviour can be influenced by belief and attitude. Overall the researcher found that the positive opinion and continuous usage was influenced UUM students intention to accept smartphone technology.

5.5.5 H5: There is moderating effect of gender on the attitude and behavioral intention of smartphone technology acceptance among UUM students.

The hierarchal analysis revealed that Gender has fail to moderate on attitude and behavioural intention. This result was match with previous study that did by Debaillon & Rockwell (2005) which there is no significant difference between males and females as regards the use of smartphones. The insignificant relationship between attitude and behavioral intention indicate that UUM male and female intention to accept smartphone technology was not influenced by attitude and behavioral intention. Thus the hypothesis is rejected.

The result form hierarchal regression revealed that smartphone technology acceptance among UUM students or in other word between male and female are no influenced by feeling, motivation, intention and fun that not create continuous adoption toward these device. On other word the physical appearance and technological aspects of smartphone technology highly influence the UUM gender to accept smartphone technology. In addition the usability and useful features of smartphone technology was highly influence UUM students intention to accept smartphone technology. In supporting this Bruner, Kumar & Anand (2007, p. 332) has state that "men tend to be more fascinated with technology than women". Meanwhile young male smartphone users pay more attention towards technical aspect and performance of smartphone such as software application, computing power and operating platform to ensure smooth and delightful experience (Osman, Talib, Sanusi, Yen & Alwi, 2011).

5.6 Limitations and Recommendations for Future Research

The technology advancement and the breakthrough design of smartphone are the key factor that attracts consumers to accept and adopt smartphone technology. Although this research clearly points out the smartphone technology acceptance among (UUM) students, unfortunately the researcher became conscious of the fact that the result of the findings could not explain the respondents' insights, feelings, and human perspectives. Therefore, in further research, there should be interviews conducted to provide deep understanding of smartphone technology.

Currently the result was relevant to describe the smartphone technology acceptance among (UUM) students with undergraduate and postgraduate student as respondent but unfortunately the researcher would not be able to generalize the findings to describe the whole population such as older people. Thus, in future research, the research should include the view of general public by analysing smartphone technology acceptance so that the findings may be more relevant.

Another limitation was at the beginning this study when trying to test gender as moderator towards smartphone technology. Unfortunately, after the data analysis process the researcher found the gender fail to moderate in explain the relationship between attitude and behavioral intention. In future, the is research should be done by using gender as moderator to measure the smartphone technology in wide range.

5.7 Conclusion

The main goal of this research is to identify the smartphone technology acceptance among (UUM) students. Based on that, the data results conveyed that most of the (UUM) students agreed that usefulness and ease of use of the smartphone technology play important roles for general use in their everyday life. Moreover, smartphone technology turns complex jobs into an easier way which serve as stimulator for several task conducted by a person. The dominance of the smartphone technology with its capabilities is not doubted and is believed to provide its users with best experience. The spread in the use of smartphones technology across various industries was due to the monopoly on the use of these phones by certain businesses and there also has been a revolution in this regards and almost everybody can now access to the purchase and use of smartphone (Steven, 2003).

This research has assumed that although there have been significant increases in Smartphone ownership in Malaysia, but most of those who owned smartphones will use only a very small percentage of the features and application that are available on their devices. In support this Verkasalo (2007) found that if a person experienced new application for a while and when they are disappointed or not satisfied with the performance of the new application they perceived to remove them from their smartphone. Cann & Geoffrey (2013) stated the reason this situation occurred was due to lack of knowledge and confidence in using smartphone technology. Pitchayadejanant (2011) suggested that smartphones manufactures should realise the difficulties faced by smartphone users in relation to its functions.

Apart from that, in this study, the researcher found that demographic data of females is higher than males (refer to table 4.3). This phenomenon occurs because majority of UUM student are females. Thus, the researcher believes that due to that issue, the responds rate for this study was dominated by females although a considerable number of researchers have argued that there is a constant demand for smartphone technology and its important role in facilitate user personnel tasks (Anetta *et al*., (2012); Arning & Ziefle (2007); Bauer & Lukowicz (2012). All in all, the researcher found that smartphone technology has been proven with its great contribution to the smartphone technology adoption among (UUM) students. In conclusion, the finding of hypothesis in this study is consistent with previous literatures (Chen *et al*., 2005; Park and Chen, 2007; Park *et al*., 2012), and it can be a guideline for the future study.

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